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Minutes of an ordinary meeting of Council held in the
Council Chambers at Philip Laing House, Dunedin on
Wednesday 26 September 2018, commencing at 1:00pm

Membership

Cr Stephen Woodhead (Chairperson)
Cr Gretchen Robertson (Deputy Chairperson)
Cr Graeme Bell
Cr Doug Brown
Cr Michael Deaker
Cr Carmen Hope
Cr Trevor Kempton
Cr Michael Laws
Cr Ella Lawton
Cr Sam Neill
Cr Andrew Noone
Cr Bryan Scott

Welcome

Cr Woodhead welcomed Councillors, members of the public, public forum speakers, media and staff to the meeting.

1. APOLOGIES

No apologies were made.

2. LEAVE OF ABSENCE

A Leave of Absence noted for Cr Lawton.

Resolution

That the request for leave of absence from Cr Woodhead be accepted.

Moved: Cr Hope
Seconded: Cr Deaker
CARRIED

3. ATTENDANCE

Sarah Gardner	<i>(Chief Executive)</i>
Nick Donnelly	<i>(Director Corporate Services)</i>
Tanya Winter	<i>(Director Policy, Planning and Resource Management)</i>
Sian Sutton	<i>(Director Stakeholder Engagement)</i>
Gavin Palmer	<i>(Director Engineering, Hazards and Science)</i>
Scott MacLean	<i>(Director Environmental Monitoring and Operations)</i>
Sally Giddens	<i>(Director People and Safety)</i>
Ian McCabe	<i>(Executive Officer)</i>
Lauren McDonald	<i>(Committee Secretary)</i> <i>(Chair Audit & Risk Subcommittee) for Item 11.3</i>
David Benham	<i>Auditor (Deloitte) for Item 11.1</i>
Brett Tomkin	<i>Senior Policy Analyst, for item 12.1</i>
Lisa Hawkins	
Gina Sweetman	<i>Consultant, for Item 12.1</i>
Anita Dawe	<i>Acting Policy Planning Manager, for Item 12.1</i>
Gerard Collings	<i>(Support Services Manager) for public excluded Item</i>

4. CONFIRMATION OF AGENDA

Cr Scott moved that item 12.1 - Plan Review and Change Process, be taken as the first report of the agenda. Seconded by Cr Noone. CARRIED.

5. CONFLICT OF INTEREST

No conflicts of interest were advised.

6. PUBLIC FORUM

ORBus Logo

Mr Peter Dowden - Bus Users Support Group Ōtepoti-Dunedin co-president expressed his concern of the placement of the ORBus logo on bus windows, as he felt it formed a visible barrier for passengers, despoiling the views out of the windows. He demonstrated images of ORBus logos on the Queenstown buses and asked for Council to review their decision before the logos were finalised for the Dunedin bus fleet.

Progressing the Minimum Flow Plan Change

Delegation from the Otago Water Resource Users Group (OWRUG), Manuherikia Catchment sub-committee, represented by Mr Gary Kelliher, Otago Water Users Group (OWRUG) Manuherikia Subcommittee and Mr Phil Page (Galloway Cook Allan)

Mr Phil Page (Galloway Cook Allan) spoke on behalf of the group. He advised the membership were concerned there was a risk that the Council might not adopt the recommendations of the Policy Committee meeting of 13 September 2018 at the Council meeting. He advised councillors had been written to since the meeting on 13 September, to encourage engagement and collaboration with all stakeholders to move the process forward for the Arrow, Cardrona and Manuherikia catchments. He confirmed that the OWRUG were committed to working with Council and other stakeholders in the catchment to get the plan change process moving.

Mr Page responded to questions of clarification by councillors.

Public Forum concluded at 1:22 pm.

7. PRESENTATIONS

No presentations were held.

8. CONFIRMATION OF MINUTES

Resolution

That the minutes of the (public portion of the) Council meeting held on 15 August 2018 be received and confirmed as a true and accurate record.

Moved: Cr Hope

Seconded: Cr Bell

CARRIED

9. ACTIONS (STATUS OF COUNCIL RESOLUTIONS)

Report	Action	Status
Delegations – Resource Management Act (Council 27/6/18)	<i>An independent review of the Council's consenting functions be undertaken</i> <i>That the Chief Executive prepares a brief on the requirements of the review for Council consideration.</i>	In progress Mrs Gardner advised it was intended to have the brief as requested before at the next Regulatory Committee. Draft is underway.
Peninsula Bus Service RPTP Implications (Council 27/6/18)	<i>That staff consult with the roading authority, the bus company and targeted consultation is undertaken to the community in a timely manner.</i>	CLOSED. Item 11.3 Council 26/9/18
Zero Carbon Emission Bill – discussion document (Council 27/6/18)	<i>That the submission is brought back to the next Policy Committee meeting</i>	OPEN
Representation Review 2018 (Council 15/8/18)	<i>That Council hear submissions on the recommended representation proposal. (on a date yet to be determined, but likely to coincide with the October 2018 committee round)</i>	In progress

Item 12.1 was taken as the first report of the meeting, as agreed under confirmation of the agenda.

12. MATTERS FOR NOTING

12.1. Plan Review and Change Process

The report outlined the process required by Council when undertaking a plan review or plan change under the Resource Management Act 1991, including the legislative requirements, national direction and identifies key elements for Council's future work program required for Council to meet these requirements.

Staff in attendance - Tanya Winter, Director Policy, Planning and Resource Management, Lisa Hawkins, Senior Policy Analyst, Anita Dawe, Policy Planning Manager, Gina Sweetman, consultant.

Ms Winter and staff summarised the process followed in undertaking the Plan Change Process, and the legislative process required in terms of future work of Council.

A presentation was made on:

- Council functions and delegated powers under the Resource Management Act 1991 (RMA) and the Local Government Act.
- Legislative Hierarchy - responsibilities under the RMA, NES, NPS, NZ Coastal Policy Statement and Regional Policy Statements
- National Policy Direction (National Policy Statements (NPS), National Environmental Standards - NES)
- National Policy Statement for Freshwater Management (NPSFWM), including overarching objectives and framework. Prescriptive values for CA1 - CA4 process for Councils
- Draft Progressive Implementation Plan (PIP) - to be prepared by 31 December 2018
- Policy work programme, including Water Plan review, NPSFM, gap analysis and NPS
- Plan Change Process - to be operative by 2025, 2030 at the latest.
- Estimated timeline to complete Freshwater Management Units 2-3 years (including review of the Water Plan).

Plan Change Process - options

Ms Gina Sweetman, consultant, spoke to the time process and requirements under the Standard (schedule 1); Collaborative, and Streamlined options. Additional information was provided to councillors at the meeting. Ms Sweetman advised that several Councils were using the standard process option initially to work with various stakeholders to develop the plan change

Cr Scott left the meeting at 02:01 pm and returned to the meeting at 02:02 pm.

Ms Sweetman advised that the Streamline process required an application to the Ministry for the Environment to use this process. Council must consult and allow for submissions, no requirement for hearing or further submissions. MFE make final decision on the plan rather than the Council, the decision cannot be appealed unless through judicial review.

Cr Hope left the meeting at 02:04 pm and returned at 02:06 pm.

Ms Sweetman outlined Section 32 and how it underpinned the process for plan changes and detailed the role and responsibilities for councillors and staff.

Discussion was held on:

- ORC's position in regard to the implementation programmes related to the NPS,
- legal judgement from the King Salmon case (Davidson section), Action - Staff to provide a link to the King Salmon case to councillors.
- seeking compromise by stakeholders and council on approach'
- standard, collaborative or streamlined approach for the Plan Change
- completion of deemed permits prior to 2021 deadline

Ms Gardner advised that a full paper would be brought to Council on the three process options (standard, collaborative, streamlined) and also the process to determine Freshwater Management Units (FMUS). She advised there were some key decisions need to be made by Council about the process before an informed conversation with the community was held.

Cr Bell moved the recommendations of the report with the addition "that a forum be held in Alexandra, led by a qualified facilitator, with relevant parties to address information gaps in regard to tributaries, receive inform on problem areas, agree to a plan for the deemed permit consenting process and to gain better understanding between all parties". Cr Noone seconded the motion.

Resolution

- a) *Receive this report*
- b) *Note this report*

Moved: Cr Robertson
Seconded: Cr Scott
CARRIED

That a forum be held in Alexandra, led by a qualified facilitator, with relevant parties to address information gaps in regard to tributaries, receive inform on problem areas, agree to a plan for deemed permits consenting process and to gain better understanding between all parties".

Moved: Cr Bell
Seconded: Cr Noone
CARRIED

Division 6/5 motion is lost.

Cr Brown left the meeting at 03:01 pm.

The meeting adjourned at 03:02 pm and reconvened at 03:24 pm.

10. CHAIRPERSON'S AND CHIEF EXECUTIVE'S REPORTS

The Chairperson's report outlined the meetings and events attended since the last Council meeting. Cr Woodhead confirmed:

- Otago CDEM Joint Committee agreed to review the shared services agreement and that the Chief Executives Group (CEG) were developing up the scope of the review.
- A programme manager position is to be appointed to oversee work as part of the Queenstown Transport Governance Group.

Resolution

That the Chairperson's and Chief Executive's reports be received.

Moved: Cr Woodhead
Seconded: Cr Noone
CARRIED

The Chief Executive's report provided a summary of meetings and events attended since the last Council meeting, including:

- key meetings
- Regional Sector Group Meeting (31 August 2018)
- Three Waters - Otago Region - done across regional sector to understand where regions are at and so that can respond when Central Government comes forward on policy on this.
- Otago Regional Council and Queenstown Lakes District Council Meeting – 28 August 2018

Cr Laws expressed his concern that he wished to receive notification and invitation to attend any meetings held by Council within the Dunstan Ward, and to receive information on discussion and outcomes of any meetings.

Resolution

That when the Chairperson and Chief Executive meet with District Council counterparts that Ward councillors will be included, if possible, in those conversations.

Moved Cr Laws
Seconded Cr Scott
Motion was lost.

Resolution

That the Chairperson's and Chief Executive's reports be received.

Moved: Cr Woodhead
Seconded: Cr Noone
CARRIED

11. MATTERS FOR COUNCIL DECISION

11.1. Annual Report

The Council's Annual Report for the period 1 July 2017 to 30 June 2018 was tabled for Council adoption. The Annual Report included the Statements of Service Performance for each Significant Activity Group and Financial Statements for the Council as a whole and for the Group. The Group comprises the Council and its wholly owned subsidiary, Port Otago Limited, and its subsidiaries.

- Statement of Service Performance
- Statement of Comprehensive Revenue and Expense
- Statement of Financial Position

In attendance: Mr David Benham, Chairperson of the Audit & Risk Subcommittee, Mr Lanham, Finance Manager and Mr Mike Roesler, Manager of Corporate Planning.

Mr Donnelly provided an overview of the report and confirmed that the auditor had advised that following satisfactory clearance of any minor outstanding audit matters, the auditor's intention was to issue a clear audit opinion on the Annual Report for the year ended 30 June 2018. The audit opinion would be issued following Council adoption of the Annual Report and signing of the Representation Letter to the Auditors.

Mr Benham provided a summary of discussion held by the Audit and Risk Subcommittee on the Annual Report and advised the committee's recommendation for the adoption of the Annual Report.

A question was raised in regard to the number of meetings attended by councillors for the 2018 year, if the number stated was correct. Mr Donnelly advised he would investigate and amend if necessary before the Annual Report's final release.

Resolution

- That this report be received.*
- That Council approves and adopts the Annual Report and Financial Statements for the year ended 30 June 2018.*
- That Council authorises the Chairperson and Chief Executive to sign the Representation Letter on behalf of Council.*

Moved: Cr Noone
Seconded: Cr Deaker
CARRIED

11.2. Leith Flood Protection Scheme – Dundas Street Stage

The report outlined the Leith Flood Protection Scheme stages of the flood protection related capital works and sought approval for the Finance and Corporate Committee to have express delegated authority to award a contract for construction of the Dundas Street Bridge stage, as it exceeded the financial delegation of the Chief Executive.

Dr Palmer responded to questions in regard to awarding of the contract and for the agreed non work days on the Dundas Street bridge stage to accommodate the University request for cessation of works during the University of Otago's 150th

celebrations in 2019. Dr Palmer confirmed the dates had been provided and were for a total of 9 days during the first half of 2019.

Resolution

1. *This report is received and noted.*
2. *The Finance and Corporate Committee be delegated the authority to award a contract for construction of the Dundas Street Bridge stage of the Leith Flood Protection Scheme.*

Moved: Cr Noone
Seconded: Cr Hope
CARRIED

The report was tabled at 4:00 pm, at the conclusion of Item 11.1 - Annual Report

11.3. Peninsula Bus Service - Hearing Panel recommendations

The report included an overview of the hearing panel deliberations and the hearing panel's recommendation to adopt "The Otago Regional Council Regional Public Transport Plan 2014 draft Addendum: Peninsula Route Variation August 2018".

Mr David Benham, Hearing Panel Commissioner responded to questions in regard to the hearing submissions and provided his summary comments.

Resolution

- a) *That Council receive this report.*
- b) *That Council adopt "The Otago Regional Council Regional Public Transport Plan 2014 Addendum: Peninsula Route Variation – August 2018" attached as Appendix 1, that:
The following amendment to the Regional Public Transport Plan provides for the Number 11 Peninsula bus service to vary;*
 - *the standard timing so that the 7.57 am scheduled service leaves 10 minutes earlier at 7.47 am, and*
 - *the route on the 7.47 am (new) inward service is to depart from the standard route on Portobello Rd, travelling along Marne St, Somerville St, and Musselburgh Rise and connecting to the standard route on Andersons Bay Road. and*
 - *the 3.08 pm (new) outward service is to depart from the standard route on Andersons Bay Road travelling along Musselburgh Rise, Somerville St and Marne St connecting to the standard route on Portobello Rd*

Moved: Cr Neill
Seconded: Cr Scott
CARRIED

11.4. The Good Water Project

The report provided an update on the completion of the initial stages of the Good Water Project, including survey results, desk top and on-site assessments.

Cr Noone left the meeting at 4:15 pm and returned at 4:17 pm.

Mr MacLean restated the rules requiring the collection of data by landowners to allow Overseer to be run. Mrs Sutton advised the ongoing engagement and education of landowners was being undertaken by staff on a catchment by catchment basis.

Cr Neill left the meeting at 04:26 pm.

Resolution

For the proposal to be ratified by Council, that:

- (a) The findings of the survey and risk assessment be noted.*
- (b) The findings of this work inform the draft Good Water Implementation Plan.*

Moved: Cr Scott
Seconded: Cr Hope
CARRIED

12. MATTERS FOR NOTING

12.1. Plan Review and Change Process

(This report was tabled as the first report of the agenda)

13. REPORT BACK FROM COUNCILLORS

Cr Deaker advised his attendance of the Tertiary Transport Planning Group meeting. He advised discussion was sought by the University with ORC on stops and super stops in the campus area. Mr Collings advised he would be speaking with Mr Brass (Otago University) in this regard. DCC representative confirmed the city would be funding the intercity bus loop service and that the DCC 2GP would be published in November. Cr Deaker advised that DCC intend to establish a governance group to oversee the spend on tertiary streets area, Cr Deaker registered an interest for ORC to have presentation on the governance group.

Cr Noone advised he had been contacted by Jo Millar of Greypower Dunedin in regard to hours of use for super gold cardholders and the possibility of a time change to include the time period 3-4 pm for subsidised travel. Mr Donnelly advised any travel outside the central government funded criteria would be at ratepayers costs Cr Noone will respond to Greypower and suggest they present to Public Forum on the matter.

14. NOTICES OF MOTION

No Notices of Motion were advised.

15. RECOMMENDATIONS ADOPTED AT COMMITTEE MEETINGS HELD ON 12 SEPTEMBER 2018

15.1. Recommendations of the Policy Committee

Resolution

Recommendations of the Policy Committee held on 13 September 2018, for adoption

Moved: Cr Robertson
Seconded: Cr Laws
CARRIED

15.2. Recommendations of the Regulatory Committee

Resolution

Recommendations of the Regulatory Committee held on 12 September 2018, for adoption

Moved: Cr Scott
Seconded: Cr Noone
CARRIED

15.3. Recommendations of the Communications Committee

Resolution

Recommendations of the Communication Committee held on 12 September 2018, for adoption

Moved: Cr Deaker
Seconded: Cr Hope
CARRIED

15.4. Recommendations of the Technical Committee

Recommendations of the Technical Committee held on 12 September 2018, for adoption

15.5. Recommendations of the Public Portion of the Finance and Corporate Committee

Resolution

Recommendations of the public portion of the Finance and Corporate Committee held on 12 September 2018, for adoption

Moved: Cr Woodhead
Seconded: Cr Noone
CARRIED

16. RESOLUTION TO EXCLUDE THE PUBLIC

Nil

Cr Robertson left the meeting at 04:43 pm.

Resolution

That the public be excluded from the following parts of the proceedings of this meeting, namely:

Regional Integrated Ticketing

Also move that Gerard Collings be permitted to remain at this meeting, after the public has been excluded, because of their knowledge of the Regional Integrated Ticketing system. This knowledge, which will be of assistance in relation to the matter to be discussed.

Moved: Cr Woodhead

Seconded: Cr Scott

CARRIED

The meeting resumed in public session on the motion of Crs Woodhead and Hope.

17. CLOSURE

The meeting was declared closed at 5:03pm.

Chairperson

Draft Progressive Implementation Programme

The National Policy Statement for Freshwater Management 2014(amended 2017) identifies that the quality, health, availability and economic value of fresh water, both surface and groundwater, in New Zealand is under threat.

The NPSFM directs local government to manage water in an integrated and sustainable way, while providing for economic growth within set water quantity and quality limits. The management of fresh water as a resource needs to reflect catchment level variation, including managing land use and development activities that affect freshwater so that growth is achieved with a lower environmental footprint.

Policy E1 of the NPSFM requires that every regional council implement the policy as promptly as is reasonable in the circumstances, and so it is fully implemented no later than 31 December 2025, or by extension, 31 December 2030. Where it is impracticable to implement by 2015, a programme of defined time – limited stages by which to implement, shall be formally adopted by Council, and publicly notified. Policy E1(f) provides for any programme previously adopted under Policy E1 to be reviewed, and formally adopted by 31 December 2018.

Therefore, in accordance with Policy E1 of the National Policy Statement for Freshwater Management 2014(amended 2017), the Otago Regional Council hereby gives public notice of its Progressive Implementation Programme for implementing Policies AA1, A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7, B8, C1,C2,CA1,CA2,CA3 and CA4 as outlined below:

Stage	Process	Completed by
Establish Freshwater Management Units(FMU's)	Objective CA 1 and Policy CA1 outline the process for setting Freshwater Management Units. This would be confirmed by Council resolution.	April 2019
Develop framework for Water Management in Otago	S 79 review of Water Plan, including three waters, land use gaps Stocktake and gap analysis of water plan against the NPSFM, NES Drinking Water,	April 2020, comprising the following: S79 review commencing February 2019; Land use gaps identified by July 2019; Stocktake and gap analysis completed by April 2019 Analysis of Rural Water Quality Strategy

	Alignment with Rural Water Quality Strategy, where practical	
Technical and specialist work Programme to understand baseline knowledge	Stocktake of baseline information for each FMU's	August 2019
Values Conversation	Policy CA2 outlines the value setting process	Commence October 2019
Technical and specialist Work Programme to support Limit setting	Using the values to understand the technical work programme required to set objectives	Commence August 2019
Plan Change		Notified December 2025

NATIONAL POLICY STATEMENT FOR FRESHWATER MANAGEMENT

The National Policy Statement for Freshwater Management 2014 (amended 2017) identifies that the quality, health, availability and economic value of fresh water, both surface and groundwater, in New Zealand is under threat and gives direction to regional councils to manage water in an integrated and sustainable way.

Regional councils are required to implement the policy 'as promptly as is reasonable in the circumstances', so that it is fully implemented no later than 31 December 2025 or by extension, December 2030. A staged approach can be adopted with public notification.

This timeline shows our intended staged approach.

ESTABLISH FRESHWATER MANAGEMENT UNITS (FMUS)

Objective CA1 and Policy CA1 outline the process for setting Freshwater Management Units. This would be confirmed by Council resolution.

BY APRIL 2019



TECHNICAL AND SPECIALIST WORK PROGRAMME TO UNDERSTAND BASELINE KNOWLEDGE

Stocktake of baseline information for each Freshwater Management Unit (FMU)

BY AUGUST 2019



VALUES CONVERSATION

Policy CA2 outlines the value setting process involving conversations with community and stakeholders to identify values, and set objectives and limits

COMMENCE OCTOBER 2019



COMMENCE FEBRUARY 2019

DEVELOP FRAMEWORK FOR WATER MANAGEMENT IN OTAGO

- S79 review of Water Plan, including three waters, starting Feb 2019
- Land use gaps identified by July 2019
- Stocktake and gap analysis of water plan against the NPSFM, NES Drinking Water, completed by April 2019
- Analysis and alignment with Rural Water Quality Strategy, where practical



COMMENCE AUGUST 2019

TECHNICAL AND SPECIALIST WORK PROGRAMME IDENTIFIED AND COMMENCED TO SUPPORT LIMIT SETTING

Building on the values to understand the technical work programme required to set objectives and limits



PLAN REVIEW NOTIFIED DECEMBER 2025

CA. National Objectives Framework

Objective CA1

To provide an approach to establish freshwater objectives for national values, and any other values, that:

- a) is nationally consistent; and
- b) recognises regional and local circumstances.

Policy CA1

By every regional council identifying freshwater management units that include all freshwater bodies within its region.

Policy CA2

By every regional council, through discussion with communities, including tangata whenua, applying the following processes in developing freshwater objectives for all freshwater management units:

- a) considering all national values and how they apply to local and regional circumstances;
- b) identifying the values for each freshwater management unit, which
 - i. must include the compulsory values; and
 - ii. may include any other national values or other values that the regional council considers appropriate (in either case having regard to local and regional circumstances); and
- c) identifying:
 - i. for the compulsory values or any other national value for which relevant attributes are provided in **Appendix 2**:
 - A. the attributes listed in Appendix 2 that are applicable to each value identified under Policy CA2(b) for the freshwater body type; and
 - B. any other attributes that the regional council considers appropriate for each value identified under Policy CA2(b) for the freshwater body type; and
 - iii. for any national value for which relevant attributes are not provided in **Appendix 2** or any other value, the attributes that the regional council considers appropriate for each value identified under Policy CA2(b) for the freshwater body type;
- d) for those attributes specified in Appendix 2, assigning an attribute state at or above the minimum acceptable state for that attribute;
- e) formulating freshwater objectives:
 - i. in those cases where an applicable numeric attribute state is specified in Appendix 2, in numeric terms by reference to that specified numeric attribute state; or
 - ii. in those cases where the attribute is not listed in Appendix 2, in numeric terms where practicable, otherwise in narrative terms;¹⁹

Policy CA3

By every regional council ensuring that freshwater objectives for the compulsory values are set at or above the national bottom lines for all freshwater management units, unless the existing freshwater quality of the freshwater management unit is already below the national bottom line for an attribute or attributes and the regional council considers it appropriate to set the freshwater objective below the national bottom line for an attribute or attributes because:

- a) the existing freshwater quality is caused by naturally occurring processes; or
- b) any of the existing significant infrastructure (that was operational on 1 August 2014) listed in Appendix 3 contributes to the existing freshwater quality; and
 - i) it is necessary to realise the benefits provided by the listed infrastructure; and
 - ii) it applies only to the waterbody, water bodies or any part of a waterbody, where the listed infrastructure contributes to the existing water quality.

Policy CA4

A regional council may set a freshwater objective below a national bottom line on a transitional basis for the freshwater management units and for the periods of time specified in Appendix 4.

Appendix 2:

Progress on Identifying FMUs by Regional Councils/Unitary Authorities

Northland	Has proposed to set river water quantity FMUs based on geophysical characteristics rather than catchment or socio-cultural boundaries and to have differing FMUs for quality and quantity.
Auckland	Auckland Council has defined nine water management areas. FMUs within each water management area have not yet been defined.
Waikato	FMUs have only been identified for water quality in the Waikato/Waipaa Catchment: Collaborative Stakeholder Group has used community and stakeholder feedback to help set eight FMUs for the Waikato and Waipaa river catchments. The group decided to create FMUs for lakes and their catchment areas based on their type (peat, dune, riverine or volcanic).
Bay of Plenty	The Bay of Plenty (BOP) Regional Council has specified nine water management zones for the region. These include: Kaituna, Maketu and Pongakawa; Ohiwa Harbour and Waiotahi; Rotorua Lakes; Tarawera; Tauranga Harbour; East Coast; Waioeka and Otara; Whakatane and Waimana; and Rangitaiki.
Gisborne	The proposed Gisborne Regional Freshwater Plan, published in October 2015, has only established FMUs in the Waipaoa Catchment Plan. There are three FMUs proposed for this catchment: Waipaoa Hill Country; Gisborne Urban; and Poverty Bay Flats. Chapters for other catchments will be added over time.
Hawke's Bay	The Hawke's Bay Regional Council formed a collaborative stakeholder group to develop recommendations for several catchments. It has seven major river catchments. In terms of water management these catchments are further divided into 15 possible management areas (note the FMUs are still not defined).
Taranaki	Taranaki does not have finalised Freshwater Management Units. In April 2015, the council released a draft Freshwater and Land Management Plan for Taranaki that proposed four FMU based on physical and hydrological characteristics as well as land use and community values. This plan change was withdrawn, and council intends to notify a proposed plan by 2020.

Manawatu-Whanganui (Horizons)	The One Plan outlines many water management zones within the Manawatu-Wanganui region. The council has also listed several water management sub-zones, or priority catchments, that are most affected by nutrient enrichment and/or bacterial contamination. These water management zones predate the NPSFM and the council may have to go through the process of identifying FMUs for the region to meet the requirements of the NPSFM.
Greater Wellington	The Greater Wellington Regional Council (GWRC) has divided up the region into 5 catchments, referred to as Whaituas. These include: Ruamahanga, Wairarapa Coast, Kapiti Coast, Te Awarua o Porirua, and the Wellington Harbour and Hutt Valley. The council has identified that these five areas place different demands on land and water resources and is enlisting the support of local people to help understand local needs and make recommendations on how they will be managed through Whaitua Committees. The first committee established in December 2013 was the Ruamāhanga Whaitua Committee, followed by the establishment of the Te Awarua o Porirua Whaitua Committee in December 2014. Both committees are still in the process of determining the water quality limits required to meet their community values.
Tasman	There are six water management areas defined in the Tasman District: Oerere/West Coast, Takaka, Upper Buller, Motueka (consists of Upper Motueka, Middle Motueka, Motuek/Riwaka Plains, Abel Tasman), Moutere, and the Waimea. The Council has set up Freshwater and Land Advisory Groups (FLAG) for the Waimea Plains and Takaka Catchments to assist the Council with implementing the NPSFM. This will enable greater involvement by the community and stakeholders in developing the water quantity and quality management provisions for water resources in these areas.
Nelson	Have identified five FMUs in the region, Whangamoā, Wakapuaka, Maitai, Stoke and Roding. Three freshwater working groups set up to help inform the process of setting freshwater objectives and limits.
Marlborough	FMUs are identified in the Proposed Marlborough Environmental Plan Maps (currently at hearing stage) and are based on the hydrological characteristics of each water resource and the natural and human use values supported by the waterbody/bodies.

West Coast	Created an implementation team in 2016, from council staff (Science, Consents and Compliance, Planning). Have produced a Regional Implementation Strategy 2018 for the NPSFM. Six FMUs proposed - Buller, Paparoa, Inangahua, Grey, Hokitika, South Westland. The FMUs have been prioritised, with the Grey FMU priority 1. A Working Group for the Grey FMU is being set up with the community.
Canterbury	There are 10 freshwater management zones in Canterbury: Kaikoura, Hurunui-Waiau, Waimakariri, Christchurch-West Melton, Banks Peninsula, Selwyn-Waihora, Ashburton, Orari-Temuka-Opihi-Pareora, Upper Waitaki, and Lower Waitaki South Coastal Canterbury. Each of these zones will consist of multiple FMUs. Each zone has a committee and has developed a ZIP - zone implementation programme. ECAN are also researching the work that would be required to set 'default' FMUs in the Land and Water Regional Plan (LWRP).
Southland	Southland is divided into five FMUs: Waiau, Mataura, Oreti, Aparima Rivers, Fiordland & the islands. Freshwater objectives, policies, limits and rules will be developed for each FMU by Dec 2025.

Schedule of Ordinary Council and Committee Meetings

January to October 2019

Month	Date	Description	Option 1	Option 2	Notes
Jan	Wed 30		Committees	Regulatory	
	Thur 31		Committees	Policy	
Feb	Wed 6	Waitangi Day			
	Tues 12			Technical	Held on Tues / Wed to allow recommendations to go to Council (following week)
	Wed 13			Comms/F&C	
	Wed 20		COUNCIL	COUNCIL	
Mar	Wed 6			Regulatory	
	Thu 7			Policy	
	Thu 14		Audit & Risk	Audit & Risk	
	Wed 20		Committees	Technical	
	Thur 21		Committees	Comms/F&C	
Apr	Wed 3		COUNCIL	COUNCIL	
	Wed 17			Regulatory	
	Thu 18			Policy	
	Fri 19	Good Friday			
	Mon 22	Easter Monday			
	Thu 25	Anzac Day			
May	Wed 1		Committees	Technical	
	Thu 2		Committees	Comms/F&C	
	Wed 15		COUNCIL	COUNCIL	
	Wed 29			Regulatory	
	Thu 30			Policy	
Jun	Mon 3	Queen's Birthday			
	Wed 12		Committees	Technical	
	Thu 13		Committees	Comms/F&C	
	Thu 19		Audit & Risk	Audit & Risk	
	Wed 26		COUNCIL	COUNCIL	
Jul	Wed 17			Regulatory	
	Thu 18			Policy	
	Wed 31		Committees	Technical	
Aug	Thu 1		Committees	Comms/F&C	
	Wed 14		COUNCIL	COUNCIL	
	Wed 28			Regulatory	
Sep	Thu 29			Policy	
	Wed 11		Committees	Technical	
	Thu 12		Committees	Comms/F&C	
	Thu 19		Audit & Risk	Audit & Risk	
	Wed 25		COUNCIL	COUNCIL	
Oct	Sat 12			ELECTION	



Otago
Regional
Council

PROPOSED REGIONAL PEST MANAGEMENT PLAN

Proposal for a Regional Pest Management Plan for Otago prepared in accordance with the Biosecurity Act 1993 and the National Policy Direction for Pest Management 2015.

Notified for submissions 1 November 2018.

Council Meeting - 31 October 2018 - Attachments



Foreword

The ecosystems and landscapes across our large and diverse region are unique and provide benefits to us both economically and environmentally.

Many of New Zealand's introduced species have significant effects on our environment, biodiversity and economy. Pests such as rabbits, wallabies, gorse, broom, ragwort and nassella tussock have an adverse effect on our production land, impacting our economy and rural communities.

Our landscape, amenity and recreation values are affected by the spread of wilding conifer trees, and aquatic weeds like lagarosiphon. Our environment and habitats of indigenous species are impacted by pest plants such as old man's beard, which smothers and kills native vegetation, and predator pests which kill our indigenous wildlife.

The Biosecurity Act 1993 is the national legislation that sets out how central government and regional councils deal with pests and unwanted organisms in New Zealand. It enables regional councils to develop regional pest management plans to control and manage pests in their region by setting objectives and rules.

Otago Regional Council has a long history of managing pests in our region. The last Pest Management Plan took effect in 2009. Since this time, changes to the Biosecurity Act 1993 and the introduction of the National Policy Direction 2015 mean there are new requirements Otago Regional Council must meet.

The Proposed Pest Management Plan identifies 38 species to be managed by land occupiers, often with the involvement of Otago Regional Council. It builds on the 2006 Pest Management Plan by introducing new objectives and rules for a range of new species including wilding conifers, wild Russell lupin, and other plant and predator pests, and introduces new rules and controls for many of the existing species such as rabbits and gorse and broom.

In developing the Proposed Pest Management Plan, as well as ensuring this meets the new Biosecurity Act requirements, the council has consulted and engaged with many different stakeholders, groups and individuals. Their feedback has shaped our Proposed Pest Management Plan, and our associated Biosecurity Strategy. Together these seek to protect the things we treasure from the impacts of harmful organisms.

Thank you to all those who have contributed their feedback to this review and have assisted in developing the Proposed Pest Management Plan.



Stephen Woodhead

Chairman

Otago Regional Council

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PART ONE: PLAN ESTABLISHMENT

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1. INTRODUCTION

1.1 PROPOSAL FOR A REGIONAL PEST MANAGEMENT PLAN FOR OTAGO

Otago Regional Council has a regional leadership role under the Biosecurity Act 1993 (the Act) and intends to establish a Regional Pest Management Plan (the Plan/Proposal). The first formal step is notification of the Proposed Regional Pest Management Plan for the Otago Region for 10 years. This builds on the 2009-2019 Pest Management Strategy for Otago and previous pest management programmes.

This document has been prepared in accordance with Part 5 of the Act. It forms the Proposal required to be developed by ORC to “make” the Regional Pest Management Plan for Otago. When the new Plan commences it will replace the existing Pest Management Plan.

In conjunction with the Plan, ORC has also prepared a Biosecurity Strategy which sets out ORC’s objectives for biosecurity management in the region using the full range of statutory and non-statutory tools available. How ORC manages biosecurity, including the management of organisms capable of causing adverse or undesirable effects is covered in the Biosecurity Strategy. The Biosecurity Strategy discusses all tools available to ORC, both regulatory and non-regulatory, to manage biosecurity risks for any organism, not just those formally specified as pests in the proposed Regional Pest Management Plan.

ORC is undertaking consultation on the Proposal and will notify the Proposal for public submissions during the period of 1 November and 14 December 2018. A hearing panel will hear submissions received on the Proposal. Following the hearing, ORC will release a written report, which will set out its decisions on the Plan and the reasons for accepting or rejecting the submissions on the Proposal. Any person who made a submission on the Proposal may make an application (similar to an appeal) to the Environment Court on any aspect of the Plan.

1.2 PURPOSE OF THE PLAN

Regional councils have a mandate under Part 2 of the Biosecurity Act 1993 to provide regional leadership in activities that prevent, reduce, or eliminate adverse effects from harmful species that are present in their region. Otago Regional Council (ORC) holds this role in the Otago region.

The purpose of the proposed Plan is to outline the framework to efficiently and effectively manage or eradicate specified organisms in the Otago region. Doing so will:

- minimise the actual or potential adverse or unintended effects associated with those organisms; and
- maximise the effectiveness of individual actions in managing pests through a regionally coordinated approach.

Many organisms in the Otago region are considered undesirable or a nuisance. This Plan manages pests where individual action or inaction in managing pests imposes undue economic, social, cultural or environmental effects and where efficient and effective pest control methods are available.

The Act has prerequisite criteria that must be met to justify such intervention. This proposal identifies those organisms classified as pests to be managed through the Plan.

Once operative, the Plan will empower the Otago Regional Council to exercise the relevant advisory, service delivery, regulatory and funding provisions available under the Act to deliver the specific objectives identified in Part Two: Pest Management.

The public can make submissions on the proposed Plan. The ORC will issue decisions after reviewing those submissions. Decisions can be appealed through the Environment Court.

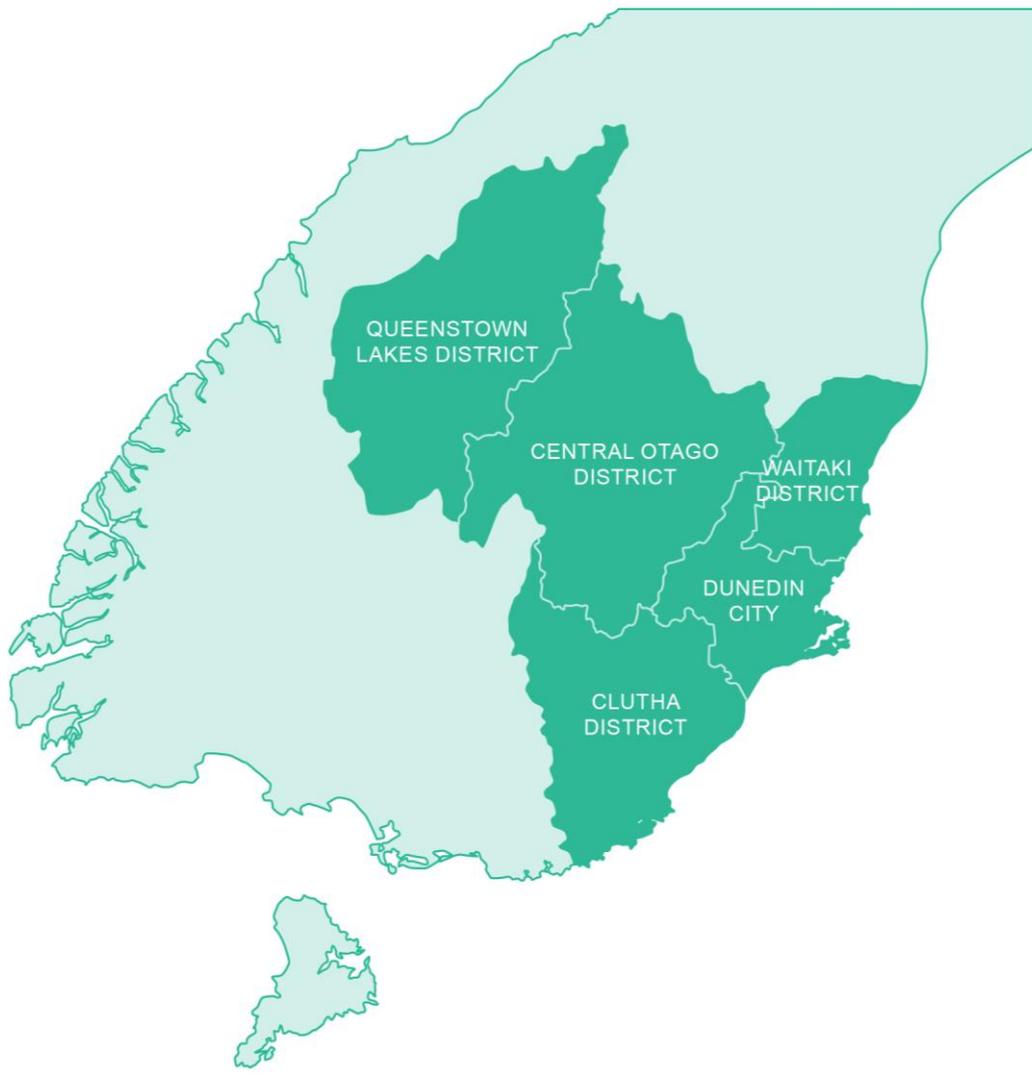
1.3 DURATION

The proposed Plan will take effect on the date on which the ORC affixes its seal and it becomes operative as a Regional Pest Management Plan under section 77 of the Act. It is proposed to remain in force for a period of 10 years following it becoming operative. The Plan may cease at an earlier date if the ORC declares by public notice that the objectives of the Plan have been achieved. It may also cease at an earlier date if, following a review, it is revoked. A review of the Plan as a whole must be undertaken after 10 years.

1.4 COVERAGE

The proposed Plan will operate within the administrative boundaries of the Otago region and covers a total area (land and sea) of approximately 32,000km² (see map below). The exclusion, eradication, progressive containment and sustained control programmes outlined in the Plan apply to the entire Otago region unless a specific, smaller area is described within the relevant programme.

Figure 1: The Otago Region



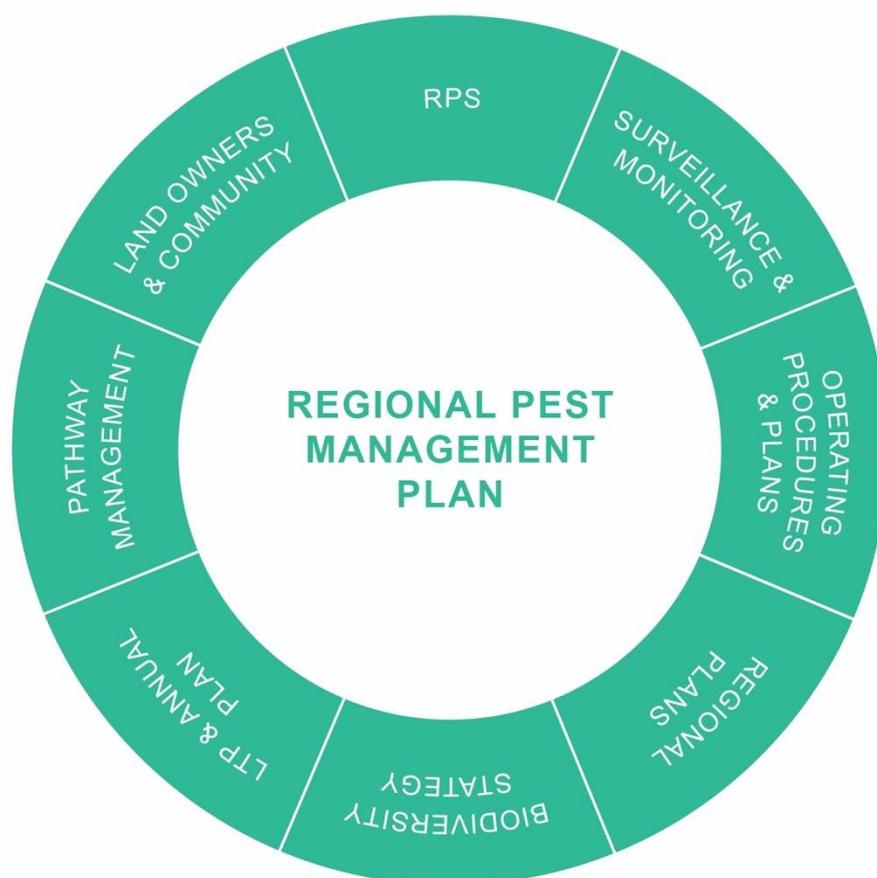
2. PLANNING, STATUTORY AND STRATEGIC BACKGROUND

2.1 STRATEGIC BACKGROUND

2.1.1 Otago Regional Council's biosecurity framework

Regional pest management sits within an integrated biosecurity framework for the Otago region. The Plan is supported by a number of complementary policies, plans, duties and functions, as illustrated in Figure 2 below. Land owners and/or occupiers and the wider community, either as beneficiaries or exacerbators (the person aggravating or contributing to a particular pest management problem by action or inaction) or both interact with these policies, plans, duties and functions.

Figure 2: Otago Regional Council's Biosecurity Framework



Proposed Biosecurity Strategy: At the same time as notifying the Plan, feedback will be sought on the proposed Biosecurity Strategy (the Strategy). The purpose of the Strategy is to set out the Otago Regional Council's wider biosecurity approach and to prioritise a programme of action to be implemented for effective biosecurity management across the Otago region.

The Strategy is a non-regulatory document that has been prepared by the ORC as part of a 'whole of Council approach' for biosecurity in the Otago region. It integrates the ORC's

statutory and non-statutory biosecurity functions, including guiding the delivery, monitoring and review of the Plan once operative.

Regional Policy Statement and Regional Plans: The Regional Policy Statement for Otago (RPS) and the Regional Water and Coast plans contain objectives, policies, rules and methods that support and complement the Plan.

In particular, the RPS contains policies and methods to:

- Control the adverse effects of pest species, prevent their introduction and reduce their spread, particularly where pests adversely affect lakes, rivers and wetlands, the coastal environmental, soil, ecosystems and indigenous biodiversity;
- Control the adverse effects of pest species, prevent their introduction and reduce their spread to safeguard indigenous species and their habitats, ecosystem services that support economic activities, water quality and quantity, soil quality, human and animal health, recreation values, landscapes, seascapes and natural character;
- Encourage, facilitate and support activities which control pests; and
- Prioritise pest management activities in areas of significant indigenous biological diversity and habitats of significant fauna.

Long Term and Annual Plan: The Otago Regional Council Long Term Plan (LTP) and the Annual Plan are developed by the ORC in accordance with the Local Government Act 2002 and Local Government (Rating) Act 2002. These plans guide the spending of rates, including spending for biosecurity purposes. The Annual Plan sets out the annual operational budgets for the ORC's biosecurity functions.

Otago Regional Council Biodiversity Strategy: The Biodiversity Strategy is a high-level document prepared in accordance with the Local Government Act 2002. The Strategy guides how the ORC will support the maintenance of indigenous biological diversity in the region.

The Biodiversity Strategy outcomes seek to reduce the impact of pests on indigenous species, provide more pest management information and support community-led initiatives.

Operational plans and procedures: The Act requires that an operational plan be prepared and reported on annually in accordance with section 100B. An operational plan sets out how the Plan is to be implemented and the report on the operational plan sets out ORC's progress towards meeting the Plan objectives.

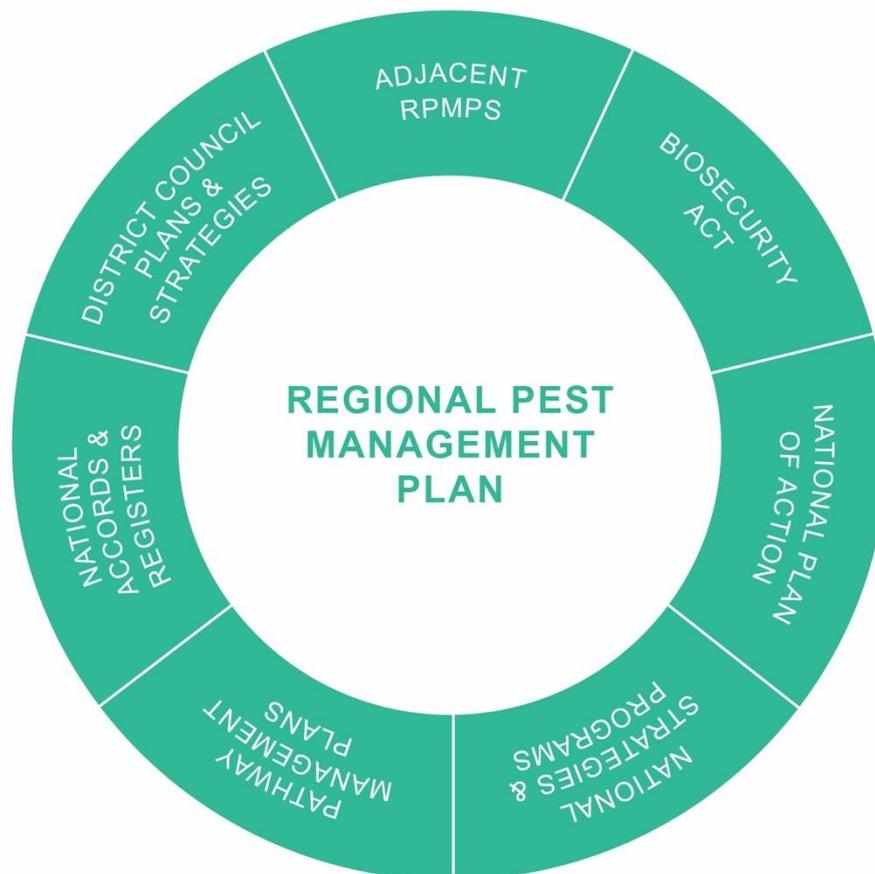
Surveillance and monitoring program: Otago Regional Council undertakes monitoring and surveillance activities in order to measure the progress made in managing pests. This may also include monitoring the Organisms of Interest in Appendix 1, and any other organisms that may present a threat to the region.

Pathway management plans: Like pest management plans, the Act enables the establishment of pathway management plans which focus on managing the movement and incursion routes of pests. These can be established at a regional or national level. No national pathway management plans are currently in place. No pathway management plan is proposed for Otago at this stage, but this may be explored in the future in accordance with the proposed Biosecurity Strategy.

2.1.2 Wider biosecurity framework

An effective biosecurity framework not only works at a regional level, but at a local and national level. Central Government is responsible for preventing pests from entering New Zealand and providing national leadership, coordination and implementation of pest incursions for eradication purposes. Other regional pest plans, pathway management plans and national legislation, policy and initiatives influence the Plan. The plans and strategies of territorial authorities also have a complementary role in biosecurity. As a result, a regional pest management plan is an integral component of a comprehensive biosecurity framework that protects New Zealand's environmental, economic, social and cultural values from pest threats.

Figure 3: Wider biosecurity framework



District council plans and strategies: There are a number of district council plans and strategies that are relevant to the Plan and have been taken into account during its development. In particular,

- The Dunedin City Council Environment Strategy 2016 seeks that pest management activities benefit Dunedin's natural ecosystems and that the best technology is used to manage pests.

- The Waitaki Biodiversity Strategy 2014 seeks to support community and voluntary actions for pest management, work collaboratively with other agencies, and to provide information on pest control and prevention measures.
- The Queenstown Lakes District Council Parks and Open Space Strategy 2017 seeks collaborative action on pest management activities in the district, and The Wakatipu Wilding Conifer Control Strategy 2013-2017 outlines goals and actions to manage wilding conifers in the district.

Adjacent regional pest management plans: The Canterbury, West Coast and Southland regions adjoining the Otago region also have regional pest management plans in place or under review that are relevant to the Otago Plan.

National accords and registers: The National Pest Plan Accord (NPPA) and National Pest Pet Biosecurity Accords (NPPBA) are cooperative agreements. The NPPA have agreements between Ministry for Primary Industries (MPI), Department of Conservation (DoC), regional councils and New Zealand Plant Producers Incorporated. The NPPBA have agreements between Ministry for Primary Industries (MPI), DoC, regional councils, Pet Industry Association and the New Zealand Companion Animal Council. The approximately 207 plant species identified in the NPPA are declared Unwanted Organisms in accordance with Part 9 of the Biosecurity Act and banned from propagation, sale and distribution. The NPPBA seeks to regulate the domestic trade of high-risk pets and encourage responsible pet ownership.

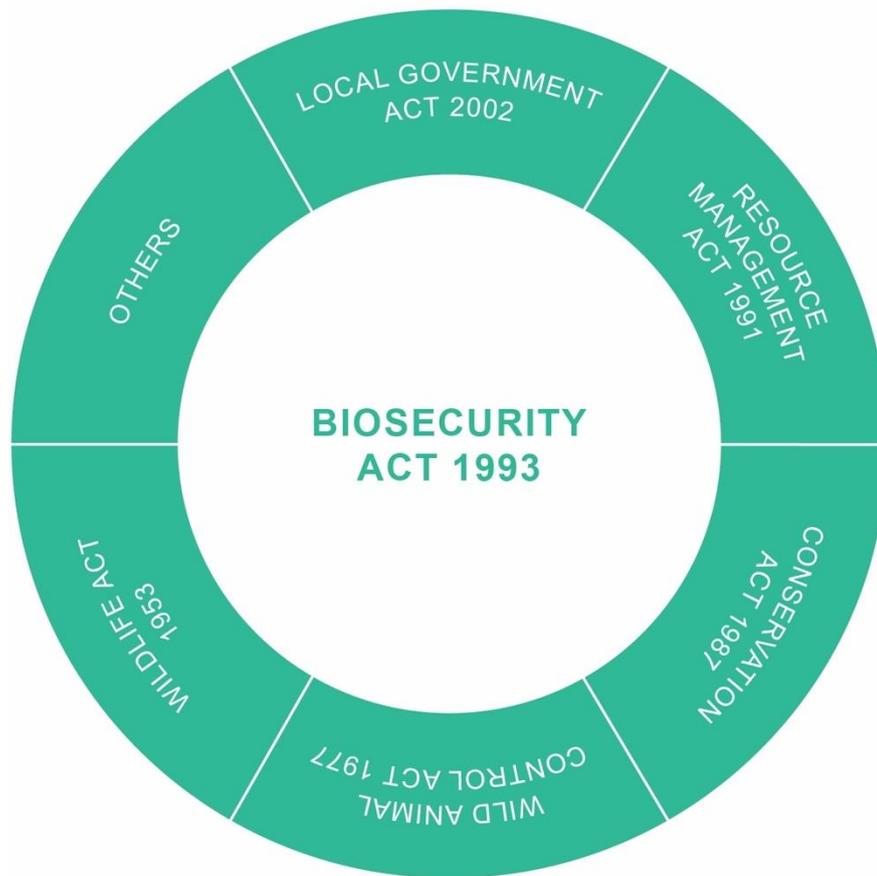
National plan of action: The Pest Management National Plan of Action sets out a number of national improvements to improve how pest management is implemented across the country including improving collective action and consistency, goal setting and measurement and pest management outcomes overall.

National strategies and programmes: The New Zealand Wilding Conifer Management Strategy 2015 – 2030 sets objectives to improve the management of wilding conifers at a national level. The New Zealand Biodiversity Action Plan 2016 and the Predator Free 2050 Programme set ambitious goals to manage the effects of pests (particularly animal predators) on indigenous biodiversity. The Otago Plan seeks to support these national objectives by managing pest species that impact on biodiversity and indigenous flora and fauna.

2.2 LEGISLATIVE BACKGROUND

There are a number of different Acts that govern regional council functions and duties. Pest management is not dependent on one particular statute, however the Biosecurity Act 1993 is the key legislative instrument to efficiently and effectively manage specified harmful organisms through the development and implementation of regional pest management plans. This is supported by other legislative statutes which supports effective pest management in the region.

Figure 4: Biosecurity legislation



2.2.1 Biosecurity Act 1993

The Act is purpose-built for pest management. A regional council can use the Biosecurity Act to exclude, eradicate or effectively manage pests in its region, including unwanted organisms. A regional council is not legally obliged to manage pests, unless it chooses to do so. As such, the Act's approach is enabling rather than prescriptive. It provides a framework to gather intervention methods into a coherent system of efficient and effective actions.

A number of amendments have occurred since 1993. Changes of relevance to regional pest management, and particularly advanced through the Biosecurity Law Reform Act 2012, include:

- Regional pest management strategies are to be redeveloped as regional pest management plans. Provision has also been made for explicit pathway management plans in addition to specified pest management plans.
- The Crown will be bound to the requirements of the Good Neighbour Rules (GNRs) specified in a regional pest management plan. Such rules apply to all occupiers within the area over which the rules apply but they can only address pests spread across a property boundary.

- The Act provides for the National Policy Direction for Pest Management 2015 (NPD). Regional pest management plans must not be inconsistent with the NPD. Further details of the NPD are provided under section 2.2.2 below.
- A mandatory plan review need not occur before 10 years. However, review of a whole plan or part of a plan can take place at any time if necessary.

Three sections of the Act are particularly pertinent to regional councils:

Part 2: Functions, powers and duties in a leadership role

Regional councils are mandated under Part 2 (functions, powers and duties) of the Act to provide regional leadership for biosecurity activities that prevent, reduce, or eliminate adverse effects from harmful organisms that are present in its region.

Section 12B(1) of the Act sets out how regional councils provide leadership. It includes ways that leadership in pest management issues can help to prevent, reduce or eliminate adverse effects from harmful organisms. Some of these activities include helping to develop and align regional pest management plans and regional pathway management plans in the region, promoting public support for managing pests, and helping those involved in managing pests to communicate and cooperate so as to make programmes more effective, efficient, and equitable.

Section 13(1) of the Act sets out powers that support regional councils in this leadership role. This includes:

- Monitor and survey pests, pest agents, and unwanted organisms;
- Provide for the assessment and eradication or management of pests in accordance with relevant pest management plans;
- Prepare proposals for, “make” and implement regional pest management plans;
- Appoint a management agency for a plan;
- Disallow an operational plan or part of it;
- Review, amend, revoke and replace, or revoke a plan;
- Declare and implement small-scale management programmes, and
- Gather information, keep records and undertake research.

Part 5: Pest Management

Part 5 of the Act specifically covers pest management, including regional pest management. Its purpose is to provide for the eradication or effective management of harmful organisms. A harmful organism is assigned pest status when it is included in a regional pest management plan. Sections 69–78 of the Act prescribe the process for developing regional pest management plans, involving six steps from initiating a plan (by a proposal), to ensuring affected parties are consulted, and develop efficient regulatory and funding mechanisms.

While a regional council may initiate a regional pest management plan, it is also required to assess and undertake decision-making responsibilities in relation to all proposed pest management plans put forward by any another person or organisation.

Part 6: Administering a Regional Pest Management Plan

Once a regional pest management plan has commenced, the management agency specified in the plan may exercise the powers in Part 6 of the Act to implement the plan where the plan provides for the agency to exercise the power. These powers include the necessary regulatory powers, instruments and cost recovery mechanisms needed for administering the plan.

2.2.2 National Policy Direction for Pest Management 2015

The Act provides for the National Policy Direction for Pest Management 2015 (NPD). The purpose of the NPD is to ensure that activities under Part 5 of the Act (Pest Management) provide the best use of available resources for New Zealand's best interests, and align with each other (when necessary), to contribute to the eradication or effective management of harmful organisms present in New Zealand (the purpose of Part 5). The NPD does this by:

- (a) clarifying requirements for Part 5 regulatory instruments; and
- (b) ensuring consistent application of these requirements nationally and between regions, as appropriate.

Regional pest management plans must not be inconsistent with the NPD, which requires that:

- Objectives must follow a prescribed content;
- Management outcomes must align with one of five programmes: Exclusion, Eradication, Progressive Containment, Sustained Control or Site-led;
- Benefits and costs must be analysed in a prescribed manner and must be documented;
- Allocation of costs must be analysed in a prescribed manner; and,
- The construction of Good Neighbour Rules must address specified criteria.

Table 1: NPD requirements and the steps taken to comply with them

NPD requirements	Steps taken to comply
Objectives are set	The structure of the objectives used in Section 5 of Part 2 of the Proposal align with the requirements of clause 4 of the NPD.
The use of programmes	The types of programmes (described in Part 2 of the Proposal) match those set out in clause 5 of the NPD.
Benefits and costs are analysed	An analysis of the costs and benefits has been undertaken in accordance with clause 6 of the NPD. The results are summarised in Section 9 of this Proposal and the full analysis is published in the report <i>Meeting the requirements of the Biosecurity Act 1993 and National Policy Direction for Pest Management 2015: Analysis of costs and benefits</i> (The CBA Report).

Funding rationale is noted	Checked the funding rationale described in Section 9 of the Proposal has been developed in line with clause 7 of the NPD.
Good Neighbour Rules are described	GNRs have been developed in line with clause 8 of the NPD. Feedback was sought from Department of Conservation and Land Information New Zealand.

2.2.3 Resource Management Act 1991

Regional councils have functions and duties under the Resource Management Act 1991 (RMA) to sustainably manage the natural and physical resources of the region, including the Coastal Marine Area (CMA). These responsibilities include sustaining the potential of natural and physical resources, safeguarding life-supporting capacity and protecting environmentally significant areas and habitats (section 5(2) and section 6(c)).

The RMA sets out the functions of regional councils in relation to the maintenance and enhancement of ecosystems in the CMA of the region (section 30(1)(c)(iii)), the control of actual or potential effects of use, development or protection of land (section 30(1)(d)(v)), and the establishment, implementation and review of objectives, policies and methods for maintaining indigenous biological diversity (section 30(1)(ga)).

The focus of the RMA is on managing adverse effects on the environment through regional policy statements, regional and district plans, and resource consents. The RMA, along with regional policies and plans can be used to manage activities so that they do not create a biosecurity risk or those risks are minimised. While the Biosecurity Act is the main regulatory tool for managing pests, there are complementary powers within the RMA that can be used to ensure the problem is not exacerbated by activities regulated under the RMA.

The Biosecurity Act cannot over-ride any controls imposed under the RMA, for example, bypassing resource consent requirements.

2.2.4 Local Government Act 2002 and Local Government (Rating) Act 2002

The Local Government Act 2002 (LGA) provides “*a framework and powers for local authorities to decide which activities they undertake and the manner in which they will undertake them*”. The Local Government (Rating) Act 2002 is a companion Act, which provides local authorities with flexible powers to set, assess, and collect rates to fund local government activities; ensures rates are set in accordance with decisions that are made in a transparent and consultative manner; and enables ratepayers to identify and understand their liability for rates.

Both of these Acts support the Otago Regional Council’s biosecurity activities, particularly through the ORC’s ability to access rates as a funding source and to differentiate rates into both general and targeted categories.

2.2.5 Wild Animal Control Act 1977 and the Wildlife Act 1953

The Wild Animal Control Act 1977 and the Wildlife Act 1953, (both administered by the Department of Conservation) have a role in relation to managing animals.

- (a) The Wild Animal Control Act 1977 (WAC Act) controls the hunting and release of wild animals and regulates deer farming and the operation of safari parks. The Wild Animal Control Act 1977 empowers the Department of Conservation to control wild deer, chamois, thar, wild goats and wild pigs. It also gives local authorities the power to destroy wild animals under operational plans that have the Minister of Conservation's consent.
- (b) The Wildlife Act 1953 (WL Act) controls and protects wildlife not subject to the WAC Act. It identifies which wildlife are not protected (eg, mustelids, possums, wallabies, rooks, feral cats); which are to be game (eg, mallard ducks, black swan); and which are partially protected or are injurious.

2.2.6 Other legislation

Other legislation, such as the Reserves Act 1977 and the Conservation Act 1987, contain provisions that support pest management within a specific context. The role of regional councils under such legislation in relation to pest management is limited to advocacy.

2.3 RELATIONSHIP WITH OTHER PLANS AND REGULATIONS

2.3.1 Pest management plans

The Proposal must not be inconsistent with:

- (a) any national pest management plan or regional pest management plan that is focused on the same organism; or
- (b) any regulation.

There are no known inconsistencies with other pest management plans on the same organism or any pathway management plan. A number of organisms included in the Canterbury, West Coast and Southland councils' current regional pest management strategies are not included in this Proposal. However, the test is in relation to any other pest management plan on the same organism. If the organism is not in the Proposal, then there is no inconsistency.

Possums and mustelids are subject to the National Pest Management Strategy for Bovine Tuberculosis (TB). The objective for the National Strategy is the eradication of TB. This affects the context for each region and does not constitute an inconsistency between plans.

2.3.2 Resource Management Act plans

The Proposal must not be inconsistent with the Otago Regional Policy Statement (RPS) or any plan developed in accordance with the RMA. The RPS signals that ORC will address pest management issues through a regional pest management plan developed under the Act. There is no inconsistency between the Proposal and the RPS.

2.3.3 Regulations

There are no known inconsistencies with any regulations.

2.4 RELATIONSHIP WITH MĀORI

One specific purpose of a regional pest management plan under the Act is to provide for the protection of the relationship between Māori and their ancestral lands, waters, sites, wāhi tapu, and taonga, and to protect those aspects from the adverse effects of pests. Māori involvement in biosecurity is an important part of exercising kaitiakitaka. Māori also carry out significant pest management through their primary sector economic interests and as land owners and/or occupiers.

The LGA requires councils to recognise and respect the Crown's responsibilities under the Tiriti o Waitangi - Treaty of Waitangi. It also requires councils to maintain and improve opportunities for Māori to contribute to decision-making processes. This includes considering ways to help Māori to contribute. These responsibilities and requirements were met while preparing this Plan and will continue after it takes effect.

2.5 CONSULTATION OVERVIEW

This Plan proposal has been prepared to provide opportunity for public feedback and submissions as part of the formal consultation process under the Act. A hearing will be held to consider all submissions prior to the "making" of the Plan and its approval by ORC.

The Plan proposal is the outcome of the review of the existing Pest Management Strategy, which has included opportunities for informal feedback by the public and stakeholders.

Stakeholder engagement on the development of a new Regional Pest Management Plan commenced in October 2017.

A stakeholder forum on biodiversity and pest management was held on 31 October 2017. This provided information about developing the new Plan and sought feedback on pest management issues in Otago. 42 stakeholders and partners from local government, statutory authorities, Kāi Tahu, environmental groups and industry groups attended the session.

ORC also held pop-in sessions in four locations across the region. These pop-in sessions were held in Cromwell, Dunedin, Balclutha and Oamaru. The purpose of the pop-in sessions was to provide an opportunity for people to provide their feedback in person about what should be included in the new Plan and what the ORC should be doing more of to manage pests in Otago.

During November 2017, the Otago Regional Council webpage also included an online questionnaire. This sought people's views on the important pest management issues in Otago, pests in the current Pest Management Strategy, pests they may wish to see in the new Plan, and any other comments they had about pest management in Otago.

Feedback received during this period was summarised and published in December 2017 *A summary of community feedback on the development of a new Regional Pest Management Plan for Otago*. This feedback informed the development of the Plan and the supporting Biosecurity Strategy.

All key stakeholders were further consulted on the draft pests and programmes for the Plan. Further meetings and workshops were undertaken with key stakeholders who had an interest in discussing the development of the Plan further with ORC.

For a full outline of all consultation please refer to the full consultation summary titled *Summary of consultation on the development of the Proposed Pest Management Plan and Biosecurity Strategy (2018)*.

3. RESPONSIBILITIES AND OBLIGATIONS

3.1 THE MANAGEMENT AGENCY

It is proposed that Otago Regional Council will be the management agency responsible for implementing the Proposal and the resultant Plan because:

- (a) Otago Regional Council is accountable to the Plan funders, including Crown agencies, through the requirements of the LGA 2002;
- (b) it is acceptable to the funders and those persons subject to the Plan's provisions because it has implemented previous regional pest management strategies; and
- (c) it has the capacity, competency and expertise to implement the Plan.

In addition to implementation methods detailed in the Proposal, Otago Regional Council maintains an internal set of operating procedures and these shall be updated to guide the delivery on the Plan.

Pest management in Otago is a shared responsibility and, while Otago Regional Council will be the management agency, pest management will be undertaken by many different stakeholders, agencies, community groups and individuals. This approach will result in effective and enduring pest management outcomes for the region.

3.2 COMPENSATION AND DISPOSAL OF RECEIPTS

The Plan will not provide for compensation to be paid to any persons meeting their obligations under its implementation. However, should the disposal of a pest or associated organism provide any net proceeds, a person will be paid disbursement in the manner noted under section 100I of the Act.

3.3 AFFECTED PARTIES

3.3.1 Responsibilities of occupiers (including owners)

Pest management is an individual's responsibility in the first instance because generally occupiers contribute to the pest problem and in turn benefit from the control of pests. The term "occupier" has a wide definition under the Act and includes:

- the person who physically occupies the place; and
- the owner of the place; and
- any agent, employee, or other person acting or apparently acting in the general management or control of the place.

Under the Act, "place" includes: any building, conveyance, craft, land or structure and the bed and waters of the sea and any canal, lake, pond, river or stream.

Occupiers must manage pests in accordance with the rules. If they fail to meet the rules' requirements, they may face legal action. For example, some rules specify that a

contravention of the rule creates an offence under section 154N(19) of the Act. Occupiers (and other persons) must not sell, propagate, breed or distribute pests.

An authorised person may enter and inspect any place, at any reasonable time, to:

- find out whether pests are on the property;
- manage pests; or
- ensure the owner and/or occupier is complying with biosecurity law.

While the occupier may choose the methods they will use to control any pests, they must also comply with the requirements under other legislation (for example the RMA and/or the Hazardous Substances and New Organisms Act 1996).

This Proposal treats all private land equitably and emphasises the responsibilities and obligations of all occupiers. Otago Regional Council acknowledges the complexity around Māori land which is multiply owned. Where occupiers are unknown, the Māori Land Court or the Registrar of Companies may help to identify and assist in communication with owners.

3.3.2 Crown agencies

Under section 69(5) of the Act, the Crown is liable to meet the obligations or costs that are required to meet GNRs contained within regional pest management plans. A GNR addresses situations where a pest may spread across a property boundary, where that spread impacts a neighbouring property where that pest is being controlled.

3.3.3 Territorial authorities

Five territorial authorities are wholly or partly contained within the Otago region. They are:

- Dunedin City Council
- Clutha District Council
- Central Otago District Council
- Queenstown Lakes District Council
- Waitaki District Council - straddles both the Otago and Canterbury regions.

Territorial authorities are required to control pests on land that they occupy, in accordance with the rules of the Proposal, and to meet the costs of doing so.

3.3.4 Road reserves and rail corridors

For the purposes of this Plan, the control of pests on roads is the responsibility of occupiers of roads.

For formed roads, the person responsible for the general management or control of the main carriageway is the occupier. For unformed roads, the person responsible is the person physically occupying the unformed road or, if it is unoccupied, the owner or person acting in the general management or control of that place.

For the purposes of the Act, KiwiRail is treated separately to the Crown, and comes within the definition of an occupier of land under the Act. Accordingly, it has obligations and

responsibilities for pest management on the land that it occupies, equal to those of other occupiers.

KiwiRail and Otago Regional Council will work by agreement to manage mutual obligations and expectations. This may include the development of agreements which provide a comprehensive approach to the management of pests in the rail corridor in accordance with the Objectives and Rules of the Plan and any exemption/s in accordance with section 78 of the Biosecurity Act 1993.

PART TWO: PEST MANAGEMENT



Tradescantia

4. ORGANISM DECLARATIONS

4.1 ORGANISMS DECLARED AS PESTS

The organisms listed in Table 2 are classified as pests. The table also indicates what management programme or programmes will apply to the pest and if a Good Neighbour Rule (GNR) applies.

Attention is also drawn to the **statutory obligations** of any person under section 52 and section 53 of the Act. Those sections ban anyone from selling, propagating or distributing any pest, or part of a pest, covered by the Plan. Not complying with section 52 and section 53 is an offence under the Act and may result in the penalties noted in section 157(1).

Table 2: Organisms classified as pests

Common Name	Scientific Name	Primary Programme	Good Neighbour Rule
Plants			
African feather grass*	<i>Pennisetum macrourum</i>	Exclusion	
African love grass*	<i>Eragrostis curvula</i>	Progressive containment	
Banana passionfruit	<i>Passiflora tripartita</i> var <i>mollissima</i> <i>P. tripartita</i> var <i>azuayansis</i> <i>P. tarminiana</i> * <i>P. pinnatistipula</i> <i>Passiflora x rosea</i> <i>P. caerulea</i>	Site-led	
Bomarea*	<i>Bomarea caldasii</i> B. <i>multiflora</i>	Progressive containment	
Boneseed*	<i>Chrysanthemoides monilifera</i>	Progressive containment	
Broom (common and montpellier)	<i>Cytisus scoparius</i> <i>Teline monspessulana</i>	Sustained control	Yes
Bur daisy	<i>Calotis lappulacea</i>	Progressive containment	
Cape ivy	<i>Senecio angulatus</i>	Progressive containment	
Chilean flame creeper	<i>Tropaeolum speciosum</i>	Site-led	
Chilean needle grass*	<i>Nassella neesiana</i>	Exclusion	
Contorta (lodgepole) pine* ⁵	<i>Pinus contorta</i>	Progressive Containment	Yes

Corsican pine ⁵	<i>Pinus nigra</i>	Progressive Containment	Yes
Darwin's barberry*	<i>Berberis darwinii</i>	Site-led	
False tamarisk	<i>Myricaria germanica</i>	Exclusion	
Gorse	<i>Ulex europeaus</i>	Sustained control	Yes
Gunnera	<i>Gunnera tinctoria</i>	Site-led	
Lagarosiphon*	<i>Lagarosiphon major</i>	Site-led	
Larch (excl. sterile hybrids) ⁵	<i>Larix decidua</i>	Progressive Containment	Yes
Moth plant*	<i>Araujia hortorum</i>	Exclusion	
Mountain pine and dwarf mountain pine ⁵	<i>Pinus uncinata</i> <i>Pinus mugo</i>	Progressive Containment	Yes
Nassella tussock*	<i>Nassella trichotoma</i>	Progressive containment	
Nodding thistle	<i>Carduus nutans</i>	Sustained control	Yes
Old man's beard*	<i>Clematis vitalba</i>	Progressive containment	
Perennial nettle	<i>Urtica dioica</i>	Progressive containment	
Ragwort	<i>Senecio jacobaea</i>	Sustained control	Yes
Scots pine ⁵	<i>Pinus sylvestris</i>	Progressive Containment	Yes
Spartina	<i>Spartina spp</i>	Progressive containment	
Spiny broom	<i>Calicotome spinosa</i>	Eradication	
Sycamore	<i>Acer pseudoplatanus</i>	Site-led	
Tradescantia*	<i>Tradescantia fluminensis</i>	Site-led	
White-edged nightshade*	<i>Solanum marginatum</i>	Progressive containment	
Wilding conifers ³	See Table 3	Progressive containment	Yes
Wild Russell lupin ⁴	<i>Lupinus polyphyllus</i>	Sustained control	
Animals			
Bennett's wallaby ^{1, 2}	<i>Macropus rufogriseus rufogriseus</i>	Eradication	

Feral cat	<i>Felis catus</i>	Site-led	
Feral deer	<i>Cervus elaphus, C. nippon, C. dama</i>	Site-led	
Feral goat	<i>Capra aegagrus hircus</i>	Site-led	
Feral pig	<i>Sus scrofa</i>	Site-led	
Feral rabbit	<i>Oryctolagus cuniculus</i>	Sustained control ¹	Yes
Hedgehog	<i>Erinaceus europaeus</i>	Site-led	
Mustelids (ferret, stoat, weasel)	<i>Mustelo furo, M. ermine, M. nivalis</i>	Site-led	
Possum	<i>Trichosurus vulpecula</i>	Site-led	
Rat (Norway, ship and Kiore)	<i>Rattus norvegicus, R. rattus, R. exulans</i>	Site-led	
Rook*	<i>Corvus frugilegus</i>	Eradication	

* Classified as Unwanted Organisms

1. Also included in Site-led programmes.
2. Unwanted Organism status expires 20/09/2021.
3. Wilding conifers are any introduced conifer tree, including (but not limited to) any of the species listed in Table 3, established by natural means unless it is located within a forest plantation, and does not create any greater risk of wilding conifer spread to adjacent or nearby land than the forest plantation that it is a part of. For the purposes of this definition, a forest plantation is an area of 1ha or more of predominantly planted trees. This also excludes planted conifers of less than 1ha, such as windbreaks and shelterbelts existing before March 2019.
4. Wild Russell lupin are Russell lupins that are established by natural means.
5. Does not include specimens used or intended to be used for planation forestry purposes in a plantation forest as defined by regulation 3(1) of the Resource Management (National Environmental Standards for Planation Forestry) Regulations 2017.

Table 3: Introduced conifer trees

Common name	Scientificname
Bishops pine	<i>Pinus muricata</i>
Contorta (lodgepole) pine*	<i>Pinus contorta</i>
Corsican pine	<i>Pinus nigra</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
Larch	<i>Larix decidua</i>
Maritime pine	<i>Pinus pinaster</i>
Mountain pine and dwarf mountain pine	<i>Pinus mugo and P.uncinata</i>
Ponderosa pine	<i>Pinus ponderosa</i>

Radiata pine	<i>Pinus radiata</i>
Scots pine	<i>Pinus sylvestris</i>

4.2 PEST AGENTS

There are some organisms specified as pest agents in the Proposal. These are distinct from other organisms which are classified as pests. Pest agents are defined in the Biosecurity Act:

Pest agent, in relation to any pest, means any organism capable of-

(a) *helping the pest replicate, spread, or survive; or*

(b) *interfering with the management of the pest.*

Pest agent rules are included in the Proposal to ensure the success of the related pest objective for wild Russell lupin *Lupinus polyphyllus*.

4.3 OTHER ORGANISMS THAT MAY BE CONTROLLED

The organisms specified as pests in the Plan are those that are capable of causing 'adverse effects of harmful organisms on economic wellbeing, the environment, human health, enjoyment of the natural environment, and the relationship between Māori, their culture, and their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga'.

Section 70(2)(d) of the Act also provides for the specification of 'any other organisms intended to be controlled' but not accorded pest status. There are many further organisms capable of causing adverse effects, particularly to biodiversity values. A number pose a sufficient future risk to warrant being watch-listed for ongoing surveillance or future control opportunities. These organisms have been categorised as 'Organisms of Interest' (OOI). OOIs are not accorded pest status but future control of them could arise, for example through site-led programmes. A review of the Plan may be necessary to include them as pests. However, OOIs may be controlled in other ways in accordance with the Proposed Biosecurity Strategy. A list of all OOIs is provided in Appendix 1.

4.4 UNWANTED ORGANISMS

A number of species have been declared nationally as Unwanted Organisms. For the most up-to-date list of Unwanted Organisms, visit the MPI website at <https://www.mpi.govt.nz>.

The National Pest Plant Accord (NPPA) currently targets 113 plant species, all of which are declared Unwanted Organisms. NPPA is a cooperative agreement between the Nursery and Garden Industry Association, regional councils and Government departments with biosecurity responsibilities. It seeks to prevent the sale and/or distribution of the specified plants where either formal or casual horticultural trade is the most significant way of spreading the plants in New Zealand. The most up-to-date list of Accord species is also available on the MPI website.

Unwanted Organism status means that such an organism is prohibited from sale, propagation and distribution in accordance with sections 52 and 53 of the Act. Where this restriction is considered sufficient for their management they are not included as pests in this Plan. However, unwanted organisms may be controlled in other ways in accordance with the Proposed Biosecurity Strategy.

5. PEST MANAGEMENT FRAMEWORK

5.1 OBJECTIVES

Objectives have been set for each pest or class of pests. As required by the NPD, the objectives include:

- the particular adverse effect/s (section 54(a) of the Act) to be addressed;
- the intermediate outcomes of managing the pest;
- the geographic area to which the objective applies;
- the level of outcome, if applicable;
- the period for achieving the outcome; and
- the intended outcome in the first 10 years of the Plan (if the period is greater than 10 years).

5.2 PEST MANAGEMENT PROGRAMMES

One or more pest management programme(s) will be used to control pests and any other organisms covered by this Plan. The types of programme are defined by the NPD and reflect outcomes in keeping with the extent of the invasion within the region and whether it is possible to achieve the desired control levels.

The intermediate outcomes for the five programmes are described below.

1. **Exclusion Programme:** to prevent the establishment of the subject, or an organism being spread by the subject, that is present in New Zealand but not yet established in an area.
2. **Eradication Programme:** to reduce the infestation level of the subject, or an organism being spread by the subject, to zero levels in an area in the short to medium term.
3. **Progressive Containment Programme:** to contain or reduce the geographic distribution of the subject, or an organism being spread by the subject, to an area over time.
4. **Sustained Control Programme:** to provide for ongoing control of the subject, or an organism being spread by the subject, to reduce its impacts on values and spread to other properties.
5. **Site-led Pest Programme:** that the subject, or an organism being spread by the subject, that is capable of causing damage to a place is excluded or eradicated from that place, or is contained, reduced, or controlled within the place to an extent that protects the values of that place.

5.3 PRINCIPAL MEASURES TO MANAGE PESTS

The principal measures used in the Plan to achieve the objectives are in four main categories. Each category contains a suite of tools to be applied in appropriate circumstances.

1. Requirement to act

Land owners and/or occupiers or other persons may be required to act where Plan rules dictate:

- (a) pests are to be controlled;
- (b) management plans are to be prepared and submitted;
- (c) the presence of pests is to be reported;
- (d) actions are to be reported (type, quantity, frequency, location, programme completion); or
- (e) pests are not to be spread (propagated, sold, distributed), and pathways are to be managed (eg, machinery, gravel, animals).

2. Council inspection

Inspection by Council may include staff:

- (a) visiting properties or doing surveys to determine whether pests are present, or rules and management programmes are complied with, or to identify areas that control programmes will apply to (places of value, exclusion zones, movement control areas);
- (b) managing compliance to regulations (rule enforcement, action on default, prosecution, exemptions);
- (c) taking limited control actions, where doing so is effective and cost efficient; or
- (d) monitoring effectiveness of control.

3. Service delivery

Council may deliver the service:

- (a) where it is funded to do so within a rating district;
- (b) on a user pays basis;
- (c) by providing control tools, including sourcing and distributing biological agents, or provisions (eg, traps, chemicals).

4. Advocacy and education

Council may:

- (a) provide general purpose education, advice, awareness and publicity activities to land owners and/or occupiers and the public about pests and pathways (and control of them);
- (b) encourage land owners and/or occupiers to control pests;
- (c) facilitate or fund community and land owners and/or occupier self-help groups and committees;
- (d) help other agencies with control, advocacy, and the sharing or sourcing of funding;

- (e) promote industry requirements and best practice to contractors and land owners and/or occupiers;
- (f) encourage land owners and/or occupiers and other persons to report any pests they find or to control them; or
- (g) facilitate or commission research.

5. Collaboration

Otago Regional Council will collaborate with other agencies and land occupier groups, which may include the development of agreements, for the effective management of pests to protect the values of specific sites, corridors and areas.

5.4 RULES

Rules play an integral role in securing many of the pest management outcomes sought by the proposed Plan. They create a safety net to protect land owners and/or occupiers from the effects of the actions or inactions of others where non-regulatory means are inappropriate or do not succeed. Importantly, amendments to the Act arising from the Biosecurity Law Reform Act 2012 now make the Crown bound by those rules identified as **Good Neighbour Rules** (GNR) in regional pest management plans.

Section 73(5) of the Act prescribes the matters that may be addressed by rules, and the need to:

- specify if the rule is to be designated as a 'Good Neighbour Rule';
- specify if breaching the rule is an offence under the Act;
- specify if an exemption to the rule, or any part of it, is allowable or not; and
- explain the purpose of the rule.

Rules can apply to owners and/or occupiers or to a person's actions in general.

The NPD and accompanying guidance notes provide extra requirements to include in the rules of a new GNR. Of particular note, the GNR will:

- (a) identify who the GNR applies to - either all owners and/or occupiers, or a specified class of owner and/or occupier;
- (b) identify the pest to be managed;
- (c) state that the pest must already be present on the owner's and/or occupier's land;
- (d) state that the owner and/or occupier of the adjacent or nearby land must, in the view of the management agency, be taking reasonable measures to manage the pest on their land; and
- (e) (if relevant) state the particular values or uses of the neighbouring land that the pest's spread affects, and that the GNR is intended to address.

6. PEST DESCRIPTIONS AND PROGRAMMES

Section 6 lists the pests to be managed under the Plan under the programme(s) to which they are assigned. The Plan proposal is required to describe, for each pest listed:

- its adverse effects;
- the reasons for a Plan;
- the objectives to be included in the Plan (see Section 5.1 above);
- the principal measures (including rules) to be used to achieve the objectives (see Section 5.3 above); and
- any other measures that would be reasonable to take to achieve the objectives.

6.1 PESTS TO BE MANAGED UNDER EXCLUSION PROGRAMMES

6.1.1 Introduction

The pests listed in Table 4 below are not known to be present in the Otago region and preventing their establishment is of benefit to the Otago community.

Table 4: Pests to be included in exclusion programmes

Common name	Scientific name
African feather grass	<i>Pennisetum macrourum</i>
Chilean needle grass	<i>Nassella neesiana</i>
False tamarisk	<i>Myricaria germanica</i>
Moth plant	<i>Araujia hortorum</i>

6.1.2 Description and adverse effects of pests to be managed under exclusion programmes

The characteristics of each pest to be managed through the exclusion programmes, and threats that they pose, are set out in Table 5 below.

Table 5: Characteristics and threats of pests in exclusion programmes

Description of the pests and adverse effects

African feather grass is a tussock-like grass forming dense clumps up to 2m high. The leaves are whitish green on top, distinctively ribbed, and dark green in colour underneath. The leaf edges feel rough when touched. The leaf sheath is covered in hairs. African feather grass produces fibrous roots and rhizomes that will form new shoots. It flowers from December to April. The flowers form a long narrow spike, straw yellow in colour, and sometimes have a purplish tinge. The seeds have bristles which allow them to become easily attached to clothing, animal hair or wool.

The extensive root system makes it difficult to remove. It produces large amounts of seeds which are easily dispersed by wind and can be carried on clothing. The plant can spread quickly, crowding out other low growing plant species. It can also adversely impact production and economic values.

For these reasons, it is included in the Proposal.



Source: Weedbusters

Chilean needle grass is a tufted perennial plant growing up to 1m. Its leaves are bright green and harsh to the touch. Identification within grazed pasture is difficult. The flowers appear in October, and have a purple tinge and ripen into hard, sharp seeds with long twisting tails. These aid the seed in the penetration of the animal's skin and the soil. It also produces viable seeds in its mid and basal stem regions (cleistogenes).

Plants will grow into dense stands and exclude other indigenous and exotic grassland species. It reduces the livestock carrying capacity of pastures due to the production of masses of unpalatable flower stalks. The sharp penetrating seeds injure livestock and result in the downgrading of wool, skins and hides. The seed can move through an animal's skin into body muscles, causing abscesses and the downgrading of carcasses. Lambs are particularly vulnerable to seeds penetrating their eyes causing blindness.

The point of the seed is extremely sharp and hairy so catches onto passing animals, vehicles, and humans. As a result, it can be transported considerable distances to new sites.

Chilean needle grass can cause adverse effects to pastoral production and economic well-being. Due to this it is included in the Proposal.



Source: Environment Canterbury

False tamarisk is a deciduous shrub (to 1.5m) with upright branches and small, narrowly triangular leaves (up to 5.5mm x 1.6mm) held close to its branches that appear bluish-green due to salt secretions on the underside. Small, pink, 5-petalled (3.2mm) flowers are in hanging clusters from January and are followed in February and March by small grey capsules containing seeds (0.7-0.9mm). The seeds are spread by wind and water.



Source: A Rebergen

False tamarisk alters the natural environment of stony river beds by reducing the habitat available for birds that nest in braided riverbeds, while also providing cover for the predators that attack them. It is included in the Proposal for these reasons.

Moth plant is a perennial, broad-leaved, herbaceous climber and can grow to over 5m tall. It has almost-oblong leaves measuring 3-11cm, flowers profusely but fruit set is low. The choko-like fruits, as big as a fist, contain about 400 parachute-like seeds, and mature fruits normally remain for long periods on the vines.



Moth plant can adversely impact environmental and human health values. It climbs over shrubs and small trees, smothering and breaking them down. It also spreads over the ground, smothering native plants of small stature and regenerating seedlings. Both fruits and stems exude a caustic milky sap when crushed or broken. This white latex is sticky, causes skin irritation in susceptible people and is poisonous to humans.

It is included in the Proposal because of these impacts.

6.1.3 Eradication programmes

The management aims and the range of methods to be used to accomplish those aims for the pests to be excluded are set out in Table 6 below. An explanation of alternative means is also provided.

Table 6: Aims and means of achievement for exclusion programmes

Objective, Principal Measures and Rules	
<p>Plan Objective 6.1.3</p> <p>Over the duration of the Plan, preclude establishment of African feather grass, Chilean needle grass, false tamarisk and moth plant within the Otago region to prevent adverse effects on economic well-being and environmental values¹.</p>	<p>Principal measures to be used</p> <p>Otago Regional Council inspection, service delivery, advocacy and education and collaboration described in section 5.3 of the Proposal will be used to achieve Plan Objective 1.</p> <p>Otago Regional Council will be responsible for any incursion control should it arise. Persons will</p>

¹ For a definition see glossary.

be encouraged to notify Otago Regional Council of the presence, or possible presence, and location within the Otago region of any of these pests.

Alternatives considered

Excluding establishment of pests is a specialised activity involving surveillance systems and the capacity to act quickly to destroy any incursions. The Otago Regional Council has better access to the necessary skills and resources for this than do individual persons. Therefore, relying on or requiring individual action as a means of achieving Plan Objective 1 is not considered a viable alternative.

There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Biosecurity Act 1993.

6.2 PESTS TO BE MANAGED UNDER ERADICATION PROGRAMMES

6.2.1 Introduction

There are three pests in the Otago region where the infestation levels are low enough to make eradication possible within the proposed 10-year duration of the Plan. These pests are listed in Table 7 below.

Eradicating Bennett's wallaby will be supported by a collaborative approach involving Otago Regional Council, Environment Canterbury, the Sustainable Farming Fund (led by Landcare Research) and the Ministry of Primary Industries.

In the case of rooks, while preventing rooks from breeding within the duration of the Plan is relatively straightforward, it may take longer to eliminate all remaining birds.

Table 7: Pests to be included in eradication programmes

Common name	Scientific name
Bennett's wallaby	<i>Macropus rufogriseus rufogriseus</i> ,
Rook	<i>Corvus frugilegus</i>
Spiny Broom	<i>Calicotome spinosa</i>

6.2.2 Description and adverse effects of pests to be managed under eradication programmes

The characteristics of each pest to be managed through the eradication programmes, and the adverse impacts they cause, are set out in Table 8 below.

Table 8: Characteristics and threats of pests in eradication programmes

Description of the pests and adverse effects	
<p>Bennett's wallaby, often called red-necked wallaby, is a marsupial that stands up to 80cm with a tail length around 62cm. Males can reach over 20kg in weight with females reaching 14kg. They have a greyish-brown upper body, pale grey chest and belly and reddish-brown (rufous) colour on the shoulders. Their hind feet and tail are black tipped. Solitary in nature, they commence breeding at about 24 months.</p> <p>Outside of the Otago region, Bennett's wallabies occupy approximately 450,000 hectares of land in South Canterbury, centred in the Hunter Hills, but including the Two Thumb Range, the Kirkleston and the Grampian mountains. Populations also occur in Kakahu Forest near Geraldine and Pioneer Park south-east of Fairlie. However, despite the efforts in Canterbury to contain this species within that region, ingress into North Otago has occurred.</p> <p>Wallabies are capable of causing significant adverse environmental effects. These include preventing the regeneration of native bush, depletion of forest understorey and possible impacts on water quality. They</p>	

also damage tall tussock grasslands, including the inter-tussock vegetation which can become depleted with a consequent increase in bare ground and higher risk of soil erosion.

Adverse economic effects include damage to pasture with anecdotal evidence of complete clearance of cover in places. There is evidence of wallabies grazing on green feed crops, particularly where these border suitable cover. Wallabies also damage exotic forests, particularly at the establishment stage, with damage being more serious in areas bordering native bush or scrub areas.

They are included in the Proposal for the reasons outlined above.



Rooks are large, glossy, purplish-black birds. They have a prominent, powerful beak with whitish patches of skin around the base. Highly gregarious, their presence is announced with a distinctive 'kaah', and as they fly they 'caw' to keep in contact with each other. Rooks forage, often up to 20km daily, from either rookeries or communal winter roosts. During breeding (August-January), all birds live in rookeries, often the same sites as used in the previous breeding seasons.



Rooks show a strong preference for foraging in fields of cereals at all stages of the crop, in recently cultivated land, and in stands of walnut trees. The effect of large flocks of rooks is to severely damage or destroy newly emerging crops and pasture.

There are thought to be less than 40 birds remaining in Otago.

Successful control has been achieved through a coordinated approach at times of favourable weather conditions and limited food sources. Unsuccessful control can lead to rooks becoming wary and much more difficult to control. Rookeries can fragment, and new rookeries establish.

For the above reasons, they are included in the Proposal.

Spiny broom is a much-branched spiny shrub <3m tall. Ridged stems with sharp spines. Dark or grey-green leaves, 3 leaflets hairy underneath and may occur in clusters. Bright yellow flowers followed by flattened seedpods.



An invasive plant that is capable of rapidly colonizing and displacing pasture species or disrupting indigenous ecosystems. Spiny broom is included in the Proposal to prevent impacts on conservation values.

6.2.3 Eradication programmes

The management aims and the range of methods to be used to accomplish those aims for the pests to be excluded are set out in Table 9 below. An explanation of alternative means is also provided.

Table 9: Aims and means of achievement for eradication programmes

Objective, Principal Measures and Rules	
<p>Plan Objective 6.2.3</p> <p>Over the duration of the Plan, reduce all infestations of Bennett's wallaby, rooks and spiny broom to zero levels within the Otago region to prevent adverse effects on economic well-being and the environment.</p>	<p>Principal measures to be used</p> <p>The requirement to act, council inspection, service delivery, advocacy and education and collaboration described in section 5.3 of the Proposal will be used to achieve Plan Objective 6.2.3.</p> <p>Otago Regional Council will take responsibility for undertaking the eradication programmes for rooks and spiny broom.</p> <p>For Bennett's wallaby, control will be a shared responsibility between Otago Regional Council and land occupiers. This will allow flexibility in designing the most effective and efficient control mechanisms to be used.</p> <p>While persons are required to report the presence, or possible presence, and location within the Otago region of Bennett's wallaby to the Otago Regional Council, persons will also be encouraged to notify Otago Regional Council of the presence of rooks or spiny broom.</p> <p>Alternatives considered</p> <p>Relying solely on occupiers to undertake voluntary action or requiring them to act to prevent adverse effects for Bennett's wallaby, rooks and spiny broom, is not considered viable. This is because spiny broom is difficult to identify and the low levels of infestations may result in many plants not being removed in a timely manner. The uneven spread of invasions places an inequitable burden on those occupiers whose properties are infested.</p> <p>Similarly, an inequitable burden exists for Bennett's wallaby and rooks because of their dispersibility, the need for coordinated control techniques and the uneven distribution of habitat.</p> <p>It is therefore preferable for beneficiaries rather than exacerbators to bear the responsibility for eradication.</p>
<p>Plan Rule 6.2.3.1</p> <p>Other than under the instruction or supervision of an authorised person, no person shall:</p> <p>(a) poison, capture or trap any rook; or</p>	<p>Explanation of rule</p> <p>The purpose of this rule is to prevent humans hindering the control of rooks. The birds are wary and require a settled environment for successful control. They are also easily dispersed.</p>

-
- (b) discharge any firearm at any rook; or
 - (c) discharge any firearm at or within 500m of any tree containing a rookery; or
 - (d) damage, disturb or interfere in any way with a rookery.

A breach of this rule or any part thereof creates an offence under section 154N(19) of the Act.

Plan Rule 6.2.3.2

All occupiers within the Otago region shall destroy all Bennett's wallaby on the land they occupy.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to prevent wallabies from becoming established in the region and causing adverse effects on economic and environmental values.

Occupiers are required to control Bennett's wallaby on their land where this can be undertaken quickly and effectively. However, due to their range and low population numbers in Otago, if an occupier observes a Bennett's wallaby on their land, but is not able to destroy it, then they are required to report the sighting immediately to Otago Regional Council in accordance with Rule 6.2.3.3 below. Otago Regional Council will then either be able to support the property occupier to destroy the wallaby or undertake the control works itself.

Plan Rule 6.2.3.3

Any person who detects or suspects the presence of Bennett's wallaby, whether dead or alive, within the Otago region, must immediately report the pest's presence and location to the Otago Regional Council.

This is required even if the Bennett's wallaby is destroyed in accordance with the above Rule 6.2.3.2.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to assist Otago Regional Council in detecting the presence of any wallabies in order to help the Council to effectively achieve the eradication programme outcomes.

Plan Rule 6.2.3.4

No person, other than an authorised person, shall keep, hold, enclose or otherwise harbour any Bennett's wallaby.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to prevent humans actively attempting to establish a wallaby population within the Otago region.

Exemptions to the rule will cater for case-by-case applications to keep wallabies for public benefit, eg. research, zoos, or any other use.

It is in the long-term interests of the region's inhabitants that biodiversity and economic well-being values are protected from the adverse effects brought about by the presence of wallabies.

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Act.

6.3 PESTS TO BE MANAGED UNDER PROGRESSIVE CONTAINMENT PROGRAMMES

6.3.1 Introduction

There are a number of pests that are well established in the Otago region, but it is still feasible to reduce their present infestation levels through progressive containment programmes. In some cases, the programmes will result in fewer sites infested, or in others, the overall density of the pest will reduce over the proposed 10 year duration period. These pests are listed in Table 10 below.

Table 10: Pests to be included in progressive containment programmes

Common name	Scientific name
Plants	
African love grass	<i>Eragrostis curvula</i>
Bomarea	<i>Bomarea caldasii</i> <i>B. multiflora</i>
Boneseed	<i>Chrysanthemoides monilifera</i>
Bur daisy	<i>Calotis lappulacea</i>
Cape ivy	<i>Senecio angulatus</i>
Nassella tussock	<i>Nassella trichotoma</i>
Old man's beard	<i>Clematis vitalba</i>
Perennial nettle	<i>Urtica dioica</i>
Spartina	<i>Spartina spp</i>
White-edged nightshade	<i>Solanum marginatum</i>
Wilding conifers ¹ , contorta, Corsican, Scots, mountain and dwarf mountain pines and larch	<i>Wilding conifers, Pinus contorta, P. nigra, P. sylvestris, P. uncinata, P. mugo and Larix decidua.</i>

¹ Refer to the definition of Wilding conifer in the Glossary.

6.3.2 Pests to be managed under progressive containment programmes by occupiers

The characteristics of each of the plant pests to be managed under these programmes, and adverse effects that they pose, are set out in Table 11 below.

Table 11: Characteristics and threats of pests in progressive containment programmes

Description of the pests and adverse effects
Plants

Bomarea is a shade tolerant, multi-stemmed vine that arises from short underground rhizomes, which bear numerous tubers. The flowers are clumped in a dense, pendulous bunch of 15 to 20. The flowers are reddish on the outside and yellow with red spots on the inside and develop into capsules about 2cm in diameter. When ripe, they split open to reveal bright fleshy orange seeds, which can be dispersed over long distances by birds.



Known to be present, or has been present, across 650 properties in Dunedin City, Otago Peninsula, and West Harbour areas.



An ornamental garden escapee, it invades alongside streams and river banks, shrublands, forest edges, forest remnants and intact low canopy forest. The vines grow into the forest canopy, forming large masses, which overtop and smother supporting trees. Large infestations can alter light levels in forests, kill mature trees and prevent seedlings from establishing.

For these reasons, it is included in the Proposal.

Boneseed is an evergreen shrub reaching up to 3m tall. The leaves are dull green, toothed and covered with a cottony down. Daisy-like flowers are produced in bright yellow clusters from late winter until late summer. Up to 50,000 seeds per plant can be produced in one year and can remain viable for up to 10 years. Seed dispersal occurs locally by birds and by water.



Boneseed is established in several sites in and around Dunedin including Portsmouth Drive, Forbury, Port Chalmers, and Aramoana and at Taieri Mouth and Moeraki.



A tolerance of dry, infertile soils allows boneseed to colonise and establish easily in coastal areas. While thought to be restricted to frost-free areas, that may not be the case. Absence of grazing animals also aids its establishment.

Boneseed's vigorous growth will displace desirable plants, shade out native seedlings and reduce or prevent public access to coastal and beach areas. It is highly flammable and will regenerate prolifically after fire. It can cause adverse effects to environmental and recreational values.

For these reasons, it is included in the Proposal.

Bur daisy is a small, perennial herb (up to 40cm tall and 1m in diameter) with many fine, green branches. Its green, thin (almost linear) leaves are fairly insignificant. The plant produces small, pom pom-like clusters of bright yellow flowers for most of the year, but are most prolific over the summer. Flowers develop into very hard, brown burs, covered in tiny hooks.



It is found on one 10 hectare block of land at an active site near Georgetown in the Waitaki Valley.

Bur daisy is a serious threat to pastoral farming, particularly causing wool contamination. Left

uncontrolled, bur daisy replaces other plant species. It produces many seeds that are quickly spread by stock movement and remain viable for many years.

It is included in the Proposal for the above reasons.

Cape ivy is a scrambling perennial, often forming a dense tangled shrub 2-3m tall, with wiry to woody stems that are sparingly branched. Very fleshy, leathery leaves have 1-3 coarse serrations on each side, and the uppermost leaves are smaller, narrower and occasionally smooth edged. Dense clusters of yellow, ragwort-like flowers (11mm diameter) are produced from March to August, followed by fluffy seeds.



The plant produces many long-lived seeds that are dispersed a long way from parent plants. Moderate growth rate and layering stems, scrambles over shrubs and ground, forms dense, tall thickets. Tolerates salt, wind, drought, semi-shade and damage.



It is found mainly in the Dunedin City and Otago Peninsula areas at 65 active sites.

Wind spreads the seed, and seed and fragments are spread in dumped vegetation and soil movement. Cape ivy smothers ground and low-growing plants to 3m tall, forming dense, long-lived mats that prevent the establishment of native plant seedlings. Coastal, rocky areas, cliffs, bush edges, regenerating lowland forests and inshore islands are at risk from this plant.

For the above reasons, it is included in the Proposal.

Nassella tussock is a tufted, perennial, tussock grass with a swollen stem. Its fine, tightly rolled, light green or yellowish-green leaves feel needle-like and very tough when fingers are run along the leaf. The plants are erect when young but slightly drooping with age and grow up to 70cm high and 80cm wide. Flowering usually commences in October and is characterised by purplish tinge. Each mature plant can produce up to 100,000 seeds per year. Roots are deep, matted and fibrous. They have been found growing 1.7m below the soil surface.



Its presence is confined to the Roxburgh, Alexandra, Cardrona and Waitaki Valley areas.

Nassella tussock adversely affects production values due to reduced pasture quality and it also affects environmental values by displacing native species in tussock grassland. It can be difficult to identify amongst other tussocks.



For these reasons, it is included in the Proposal.

Old man's beard is a deciduous, perennial, climbing, layering vine to 20m tall with very long, woody stems with six prominent ribs (appear as furrows in older vines) and pale, easily rubbed-off bark. Leaves are arranged in opposite pairs on the stems and are made up of five (sometimes three) widely spaced, thin, papery leaflets. Creamy white, fragrant flowers (2-3cm diameter) are produced from December to May, followed by grey, hairy seeds (2-3mm long) with distinctive white plumes (3-4cm long) in dense, fluffy clusters persisting over winter (hence the 'old man's beard'). Native clematis usually has 3 leaflets per stem, smooth stems, and is evergreen. It is found in exotic forest, native forest remnants, shelterbelts and hedgerows, waste ground, on riverbanks and in gardens. The plant is found on 2600 urban properties across the region and is known to occupy several hundred hectares of rural land, riverbeds and margins across the region.



It is capable of smothering and killing all plants to the highest canopy and prevents the establishment of native plant seedlings. Its seeds are both wind and water borne.

For these reasons, it is included in the Proposal.

Perennial nettle can grow up to 1.5m high. Its stems are woody, its flowers are green and its leaf is a lighter colour green than common stinging nettle (*Urtica urens*). It grows taller than common stinging nettle and it has an extensive system of underground rhizomes, whereas common nettle does not have rhizomes. The seeds are 1-1.5mm long, flat, oval and yellow to greyish in colour. Its underground rhizomes can spread 2.5m in a season.



It is a particular problem in South Otago mainly Balclutha, Lawrence and Clydevale (along the Clutha River).



The sting causes itching and burning which may last for several days. Animals shy away from the plant because of its stinging hairs. The pollen from this plant may cause hay fever.

Perennial nettle's extensive system of underground rhizomes, and its ability to form tall dense stands means it can easily invade paddocks and dominate good pasture. It tolerates a wide range of conditions, soil types and localities from shade and damp, to very dry. It can be found in pastures, in areas where stock shelter or congregate, waste areas, river banks, roadsides and old house sites.

It is included in the Proposal for the above reasons.

Spartina is a perennial estuarine sward grass, commonly 1m tall and growing in shallow saltwater. It has stiff, upright stems, originating from thick rhizomes. The stems have broad, pointed leaves from their base to the top, where several long fingers contain the seed. New growth occurs from either root pieces or seed. Shoots rapidly sprout from belowground rhizomes, while the seed falls into the water and floats away.



Scattered infestations occur in Pleasant River Estuary, Karitane Estuary, the Lower Taieri Gorge and Catlins Lake.

Colonies of spartina form dense grassy clumps, and these can spread laterally from underground rhizomes, or by over ground side shoots (tillers). Within the estuarine area, vast meadows can form causing a build-up of sediment. This can increase the risk of flooding and also alter the habitat for wading bird species and other estuarine flora and fauna.



For these reasons, it is included in the Proposal.

White-edged nightshade is a quick growing perennial shrub that can grow up to 5m tall. The large woody stems and green oak-shaped leaves are covered in nasty sharp spines. Its leaves have white veins on the upper surface and dense chalky-white hairs on the underside. In summer white or pale mauve flowers bloom in clusters at the end of branches. Green-yellow tomato-shaped berries grow on the ends of prickly stalks.



It is confined to one site near Hampden, but is also known to have existed on Quarantine and Goat Islands in the Otago harbour.

The shrub is well adapted to dry areas. Once established, it forms dense thickets that are impenetrable to stock. It also prevents the establishment of native understory on margins of native bush. White edged nightshade adversely affects economic well-being and environmental values and is included in the Proposal for those reasons.

The management aims and the range of methods to be used to accomplish those aims for the pests to be progressively contained (private occupier responsibility) are set out in Table 12 below. An explanation of alternative means is also provided.

Table 12: Aim and means of achievement for pests in progressive containment programmes

Objective, Principal Measures and Rules	
<p>Plan Objective 6.3.2</p> <p>Over the duration of the Plan progressively contain and reduce the geographic distribution or extent of bomarea, boneseed, bur daisy, cape ivy, nassella tussock, old man’s beard, perennial nettle, spartina and white-edged nightshade at known sites within the Otago region to minimise or prevent adverse effects on economic well-being and the environment.</p>	<p>Principal measures to be used</p> <p>Appropriate measures drawn from the suite of activities listed under requirement to act, council inspection, advocacy and education, and collaboration described in section 5.3 of the Proposal will be used by Otago Regional Council to achieve Objective 6.3.2.</p> <p>Generally, occupiers will carry out the necessary control work to remove these plant pests.</p> <p>Alternatives considered</p> <p>Otago Regional Council could take on the responsibility for these plant pests. However, their extent or infestation densities are such that the logistics of carrying out the control programmes would be difficult to integrate with individual property occupier management requirements. It is also unlikely to be cost effective. This alternative is therefore rejected.</p> <p>Relying on voluntary individual action to minimise adverse impacts of these plant pests would not be effective due to inadequate incentives to do so.</p> <p>There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.</p>
<p>Plan Rule 6.3.2.1</p> <p>All occupiers within the Otago region shall eliminate bomarea infestations on the land that they occupy.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant’s ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to ensure infestation levels are reduced and threats to environment values are minimised.</p>
<p>Plan Rule 6.3.2.2</p> <p>All occupiers within the Otago region shall, upon receipt of a written notice from an Authorised Person, eliminate boneseed infestations on the land that they occupy.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant’s ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to ensure infestation levels are reduced and threats to environment values are minimised.</p>
<p>Plan Rule 6.3.2.3</p>	<p>Explanation of rule</p>

<p>All occupiers within the Otago region shall eliminate bur daisy infestations on the land that they occupy.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>The reason for this rule is to ensure infestation levels are reduced and threats to economic well-being are minimised.</p>
<p>Plan Rule 6.3.2.4</p> <p>All occupiers within the Otago region shall eliminate cape ivy infestations on the land that they occupy.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to ensure infestation levels are reduced and threats to environment values are minimised.</p>
<p>Plan Rule 6.3.2.5</p> <p>All occupiers within the Otago region shall eliminate nassella tussock infestations on the land that they occupy.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to ensure infestation levels are reduced and threats to economic well-being and environment values are minimised.</p>
<p>Plan Rule 6.3.2.6</p> <p>All occupiers within the Otago region shall eliminate old man's beard infestations on the land that they occupy.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to ensure infestation levels are reduced and threats to environment values are minimised.</p>
<p>Plan Rule 6.3.2.7</p> <p>All occupiers within the Otago region shall eliminate perennial nettle infestations on the land that they occupy.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to ensure infestation levels are reduced and threats to economic well-being are minimised.</p>
<p>Plan Rule 6.3.2.8</p> <p>All occupiers within the Otago region shall, upon receipt of a written notice from an Authorised Person, eliminate spartina infestations on the land that they occupy.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to ensure infestation levels are reduced and threats to economic well-being and environment values are minimised.</p>

For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.

A breach of this rule creates an offence under section 154N(19) of the Act.

Plan Rule 6.3.2.9

All occupiers within the Otago region shall eliminate white-edged nightshade infestations on the land that they occupy.

For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to ensure infestation levels are reduced and threats to economic wellbeing and environment values are minimised.

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Biosecurity Act 1993.

6.3.3 Pests to be managed under progressive containment programmes by Otago Regional Council

The characteristics of each of the plant pests to be managed under these programmes, and adverse effects that they pose, are set out in Table 13 below.

Table 13: Characteristics and threats of pests in progressive containment programmes

Description of the pests and adverse effects

Plants

African love grass is a vigorous, clump-forming, perennial grass up to 1.5m tall. It is densely tufted with narrow leaves (harsh to touch) and usually curly at the tips. The leaves are bright green to blue-green (leaves turn bronze-red after a hard frost). Leaf margins rolled inwards and are usually hairless. It has fibrous roots, up to 50cm deep. The flower heads (panicles) are pyramid-shaped with small, white flowers. Its blackish, olive-purple seeds are attached to arching stems over 1m long.



Infestations are limited to 20 active sites across the Otago region. The plant is capable of rapidly invading bare and disturbed sites. Once established, it forms dense stands and suppresses other herbaceous species. It is a prolific seeder, has low palatability for grazing animals and is difficult to detect.

For these reasons, it is included in the Proposal.

The management aims and the range of methods to be used to accomplish those aims for the pests to be progressively contained (ORC responsibility) are set out in Table 14 below. An explanation of alternative means is also provided.

Table 14: Aim and means of achievement for pests in progressive containment programmes

Objective, Principal Measures and Rules	
<p>Plan Objective 6.3.3</p> <p>Over the duration of the Plan, progressively contain and reduce the geographic distribution or extent of African love grass at known sites (as shown on Map 1 in Appendix 3) within the Otago region to minimise or prevent adverse effects on economic well-being and the environment.</p>	<p>Principal measures to be used</p> <p>Appropriate measures drawn from the suite of activities listed under requirement to act, council inspection, service delivery, advocacy and education described in section 5.3 of the Proposal will be used by Otago Regional Council to achieve Objective 6.3.3.</p> <p>Generally, Otago Regional Council will carry out the necessary control work to remove African love grass. It is useful however for occupiers to report the presence of African love grass at sites outside of the known sites.</p> <p>Alternatives considered</p> <p>Relying on occupiers to undertake voluntary action or requiring them to act to prevent adverse effects caused by African love grass is not considered viable. African love grass is difficult to identify and the low levels of infestations may result in many plants not being removed in a timely manner.</p> <p>It is therefore preferable for beneficiaries rather than exacerbators to bear the responsibility for this programme.</p> <p>There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.</p>

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Biosecurity Act 1993.

6.3.4 Progressive containment programme for wilding conifers contorta, Corsican, Scots, mountain and dwarf mountain pines and larch

The characteristics of wilding conifers to be managed under this programme, and adverse effects that they pose, are set out in Table 15 below.

Table 15: Characteristics and threats of wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and larch

Description of the pest and adverse effects
<p>Wilding conifers can have significant impacts on native ecosystems, particularly those with low-stature</p>

vegetation². Wilding conifers grow faster and taller than low-stature native plants and so can shade out many of these species. Where there is dense wilding conifer growth, this can lead to local extinction of native plant communities, the drying of wetlands and riparian areas, and resulting impacts on native fauna through the loss of habitat. Soil and soil fauna are also altered when wilding conifers replace native ecosystems.

Otago's iconic landscape is vulnerable to the invasion of wilding conifers. If not controlled, they would significantly change the landscape and impact on our recreational, hydrological and conservation values. Particularly at risk is our high country and tussock grasslands. The growing problem has been recognised for some years, and as a result, the Wakatipu Wilding Conifer Control Group and the Central Otago Wilding Control Group established themselves solely to fight wilding conifers.

A National Wilding Conifer Control Programme has been developed and funded by government agencies, landowners, and local communities to address infestations. The extent within Otago ranges from very dense wilding infestations in the Wakatipu area, through to very low wilding conifer numbers scattered over thousands of hectares. Control efforts to date have been very successful where the work has been carried out, but will require an ongoing effort for many years to come in follow-up work, and in areas where control is yet to be undertaken.

Most wilding conifer species do not pose a significant threat to established native forests, however some species are adapting to new areas and in particular, Douglas fir has a higher shade tolerance than other introduced conifer species and can consequently spread into shrublands, regenerating native forest and mature forest where there are canopy gaps and a relatively sparse understory.

Wilding conifers can adversely affect amenity and landscape values, particularly where the valued landscapes are characterised by extensive low-stature vegetation such as high country tussock grasslands. These landscapes are important for tourism and large-scale landscape changes could impact on this. Dense wilding conifer spread can impact water availability lead to the blocking and/or changing of valued views and vistas, and can impede access to, and enjoyment of, recreational areas.

In areas where there is long-term, seasonal soil moisture deficits, dense wilding conifers can contribute to reductions in surface water flows, potentially impacting



² Indigenous ecosystems at particular risk from wilding conifer invasion include: tussock and other indigenous grasslands, alpine ecosystems, subalpine and dryland scrub and shrublands, frost-flats, wetlands, turf communities, geothermal areas, dunelands, ultramafic/serpentine areas, rockfields and herbfIELDS, riparian areas, coastal margins, bluffs and cliffs.

on water availability and aquatic ecosystems. Wilding conifers can also increase the risk posed by wild fires. In areas of extensive pastoral farming, wilding conifer infestations adversely impact economic well-being by reducing available grazing land and limiting future land use options due to the high costs of control. Wilding conifers are included in this Proposal for the above reasons.

Contorta (lodgepole) pine, Corsican pine, Scots pine, dwarf mountain pine, mountain pine and larch

In addition to the adverse effects list above for the wilding offspring of these conifers, wilding conifers often occur as a result of seed spread from planted conifer trees. It can be difficult to successfully control or manage the spread of wilding conifers over the long term if the seed source is not removed or appropriately managed and contained. This set of conifers has very limited commercial value and they are also highly invasive. It is therefore appropriate to specify these organisms as pests in their own right, in addition to being pests under the wilding conifer definition in their naturally regenerated state. It would effectively prevent new plantings of these species, and ensure where these species are cleared using publicly funded control operations that they stay clear.

Contorta in particular, is the most invasive introduced conifer species and represents a significant proportion of all wilding conifers and original sources of wilding conifer spread.

Existing planted conifers less than 1ha

Existing contorta shelter belts and other conifer shelterbelts are often used to provide shelter for stock.

It can be difficult to successfully control or manage the spread of wilding conifers over the long-term if the existing planted seed sources are not removed or appropriately managed and contained. The Plan does not include rules requiring the removal of existing shelter belts and other existing planted conifers less than 1ha. Rather, transition arrangements for their long-term removal, starting with the removal of contorta shelter belts, are outlined in the proposed Biosecurity Strategy attached to this Proposal.

The management aims and the range of methods to be used to accomplish those aims for the pests to be progressively contained are set out in Table 16 below. An explanation of alternative means is also provided.

[Table 16: Aim and means of achievement for wilding conifer progressive containment programmes](#)

Objective, Principal Measures and Rules

Plan Objective 6.3.4

Over the duration of the Plan, progressively contain and reduce the geographic extent of wilding conifers³ within the Otago Region to minimise adverse effects on economic well-being and the environment. This may involve the destruction of contorta, Corsican, Scots, mountain and dwarf mountain pines and larch.

Principal measures to be used

Appropriate measures drawn from the suite of activities listed under **requirement to act, collaboration, council inspection, service delivery, advocacy and education** described in section 5.3 of the Proposal may be used by Otago Regional Council to achieve Plan Objective 6.3.4.

Plan Objective 6.3.4 is also achieved under The National Wilding Conifer Control Programme – a collaborative funding model for wilding conifer control. Parties to this programme could include the Ministry for Primary Industries, Department of Conservation, Land Information New Zealand, Otago Regional Council and private land holders.

Alternatives considered

Relying on voluntary action of individuals to achieve Plan Objective 6.3.4 is not considered viable due to the nature of the pest and the lack of incentives for voluntary action. Otago Regional Council could take on the responsibility for region-wide wilding conifer control. However, the extent of infestations is such that it is beyond the financial resources of the ratepayers.

Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both occupiers and the wider community. This alternative is therefore rejected.

There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.

Plan Rule 6.3.4.1

Within the Otago Region occupiers shall destroy all wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch present on land that they occupy prior to cone bearing, if –

- a) the wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines, and/or larch are located within an area which has had control operations carried out to destroy wilding conifers since January 2016; and

Explanation of rule

The purpose of this rule is to ensure that new infestations of wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch are prevented from re-establishing at sites where wilding conifers have previously been destroyed through publicly funded control operations.

³ Wilding conifers are any introduced conifer tree, including (but not limited to) any of the species listed in Table 3, established by natural means unless it is located within a forest plantation, and does not create any greater risk of wilding conifer spread to adjacent or nearby land than the forest plantation that it is a part of. For the purposes of this definition, a forest plantation is an area of 1ha or more of predominantly planted trees. This also excludes existing planted conifers of less than 1ha, such as windbreaks and shelterbelts existing before March 2019.

-
- b) the control operations were publicly funded (either in full or in part).

A breach of this rule creates an offence under section 154N(19) of the Act.

Plan Rule 6.3.4.2

Within the Otago Region occupiers shall destroy all wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch present on land they occupy within 200m of an adjoining property boundary prior to cone bearing, if –

- a) wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch have previously been destroyed through control operations on the adjoining property; and
- b) the control operations on the adjoining property were within 200m of the boundary and were undertaken since January 2016.

A breach of this rule or any part thereof creates an offence under section 154N(19) of the Act.

Explanation of rule

Over the duration of the Plan, to ensure that the spread of wilding conifers contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch does not cause unreasonable costs to the occupiers of adjoining properties, where wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch have previously been destroyed through control operations on the adjoining property.

Any action pertaining to non-compliance will only be initiated upon a complaint in writing from the adjoining affected occupier.

Plan Rule 6.3.4.3

Note: This is designated a Good Neighbour Rule

Within the Otago Region occupiers shall destroy all wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch present on land they occupy within 200m of an adjoining property boundary prior to cone bearing where –

- a) the adjoining land has previously been cleared through control operations since January 2016; and
- b) the occupier of that adjoining land is taking reasonable steps to manage wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch on their land, within 200m of the boundary.

A breach of this rule creates an offence under section 154N(19) of the Act

Explanation of rule

Over the duration of the Plan, to ensure that the spread of wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch does not cause unreasonable costs to the occupiers of adjoining properties, where wilding conifers have previously been destroyed through control operations on the adjoining property and the adjoining occupier is undertaking active wilding conifer management.

Any action pertaining to non-compliance will only be initiated upon a complaint in writing from the adjoining affected occupier.

The rule is required in addition to Plan Rule 6.4.3.2 as the National Policy Direction requires that before a rule can be identified as a good neighbour rule, the Otago Regional Council must be satisfied that the adjacent occupier is taking reasonable measures to manage the pest or its impacts.

Advice Notes

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Act.

Occupiers may make an application to the Otago Regional Council for an exemption from the rules under section 78 of the Biosecurity Act 1993. This section should be referred to in full in the Act.

6.4 PESTS TO BE MANAGED UNDER SUSTAINED CONTROL PROGRAMMES

6.4.1 Introduction

There are a number of pests that are securely established in the Otago region and therefore containing their presence is the most appropriate form of management. In some cases, spread from infested areas across property boundaries to neighbouring areas that are clear or being cleared will be prevented eg. gorse or nodding thistle. For others it is a case of holding population levels to acceptable limits eg. feral rabbits. The pests that are subject to sustained control programmes are listed in Table 17 below.

Table 17: Pests to be included in sustained control programmes

Common name	Scientific name
Plants	
Broom (common and montpellier)	<i>Cytisus scoparius</i> <i>Teline monspessulana</i>
Gorse	<i>Ulex europeaus</i>
Nodding thistle	<i>Carduus nutans</i>
Ragwort	<i>Senecio jacobaea</i>
Wild Russell lupin	<i>Lupinus polyphyllus</i>
Animals	
Feral rabbits	<i>Oryctolagus cuniculus</i>

6.4.2 Description and adverse effects of pests to be managed under sustained control programmes

The characteristics of each of the plant pests to be managed under these programmes, and adverse effects that they pose, are set out in Table 18 below.

Table 18: Characteristics and threats of pests in sustained control programmes

Description of the pests and adverse effects	
<p>Broom (common) is a leguminous, branched perennial shrub up to 2.5m tall with bright yellow flowers. Stems are green and woody, five ribbed and hairless. Montpellier broom, while somewhat smaller in stature, except for slightly smaller yellow flowers, is very difficult to distinguish from common broom. They are therefore treated together. Dark ripened seedpods explode during summer, propelling hard seed up to 5m from the parent plant. The seed may also land on stock, particularly sheep, or in water and be transported much further. Seed can remain viable for many years (>50 years) in soil and gravel. Transport of such infested material can contribute to spread over longer distances.</p>	

Broom is capable of establishing on land throughout the region. However, large areas of Central Otago and the Queenstown Lakes are predominantly clear of infestations. Where it is present, density varies from light to heavy depending upon the intensity of grazing management. It is most prevalent on lightly grazed or non-grazed areas.

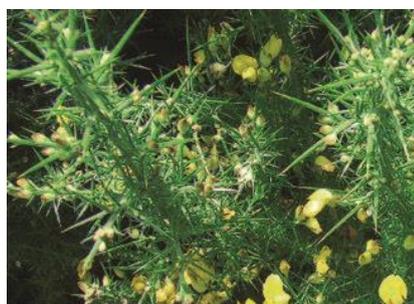


Broom seedlings are unable to compete with productive pasture. Where insufficient grazing pressure is exerted, the plants can establish dense stands that can shade out most other herbaceous species and destroy pasture.

Provided taller tree species can become established within broom colonies, they will eventually displace broom.

Broom is included in the Proposal for the above reasons.

Gorse is a sharply spinous, woody, deeply rooted, leguminous perennial shrub. It grows up to 4m tall with thick stems. Seeds can be ejected up to 5m from pods and the plant may seed twice a year. Seed may survive in the soil for more than 50 years.



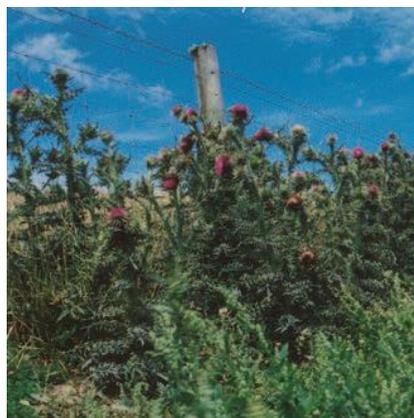
Gorse is capable of establishing on land throughout the region. However, large areas of Central Otago and the Queenstown Lakes are predominantly clear of infestations. Density varies from light to heavy depending upon the intensity of grazing management. It is most prevalent on lightly grazed and non-grazed areas.

Gorse forms dense thickets that prevent stock from grazing infested areas. Seed may be spread by water, birds, road-making, gravel extractions, animals and machinery.

It is generally perceived as a threat to pastoral values and low stature indigenous vegetation. However, if left undisturbed and in the presence of a seed source, tall indigenous vegetation particularly can overtop and suppress gorse.

Gorse is included in the Proposal primarily because the adverse effects, overall, outweigh its beneficial attributes.

Nodding thistle is an annual or biennial thistle that grows from an over-wintering rosette and is similar to the Scotch thistle, although more erect and spiny. Its flowering stems grow up to 1.5m high bearing large crimson flower heads that droop or “nod” when mature.



Nodding thistle is found on sheep farming areas in many parts of Otago. A single mature plant is capable of producing up to 10,000 seeds. It is not readily grazed because of its spiny foliage. Single rosettes can occupy an area greater than one square metre, so large infestations can seriously reduce the stock carrying capacity of affected pasture. The plant is resistant to drought and seed can remain viable for up to 20 years.

It is included in the Proposal for these reasons.

Ragwort is an erect biennial or perennial herb that is commonly 45-60cm tall but can grow to almost 2m high. It produces bright yellow flowers in clusters, from November to April.



The plant is toxic to grazing cattle, deer and horses because its poisonous alkaloids cause liver cirrhosis, photosensitisation, jaundice and wasting. Poisoned animals may take some months to die. They do however electively avoid grazing it.

Sheep will eat Ragwort without any apparent adverse effects, unless they are continually exposed to it in large quantities, or if they are not used to feeding on it.

It can dominate pasture once established, almost completely excluding other pasture species in the worst instances, and significantly reducing the amount of grazing available to stock. Also, the plant is invasive in riverbeds, disturbed forest and shrubland, coastal areas, bare land and other short-stature vegetation types. It forms dense stands in these areas as it does in pasture. However, it usually disappears when a canopy forms, which decreases light levels reaching the ground layer.

For these reasons, it is included in the Proposal.

Russell lupin is a quick growing perennial herb, up to 1m tall, with multiple, erect, hairy stems with clusters of 8-15 leaflets (3-13 x 1-3cm) that are usually hairless above and silky below. Produces an erect flowerhead spike (15-60cm long) bearing many slightly scented and multiple coloured flowers (12-20mm) from September to February. The plant produces a large amount of mottled dark brown seed that are spread mainly by water and also by humans distributing them along roadsides. The seed remains viable for many years.



Russell lupin tolerates wind, warm to cold, flooding and drought, low fertility (fixes nitrogen) and fire. Intolerant of moderate shade. It rapidly invades shingly braided river systems and the dense, self-replacing stands provide hiding places for predators of the (often endangered) birds that would usually nest safely on these bare islands. The dense infestations also interfere with water flow along these rivers, changing the ecosystem for the birds that live there. Increased soil nitrogen may induce change in species composition in plant communities from low fertility species to weed species. Causes sand and gravel to build up, altering shape of rivers and contributing to flooding and erosion. Increased cover may prevent some birds (eg. dotterels, wrybills) nesting,



and may increase predation by cats, mustelids, etc. on birds.

Disturbed lowland and sub-alpine shrubland, short tussock-land and wetlands are susceptible to invasion.

For these reasons, wild Russell lupin is included in the Proposal.

6.4.3 Sustainable control programme for broom and gorse

The management aims and the range of methods to be used to accomplish the aims for broom to be managed under the sustainable control programme in Otago is set out in Table 19 below. An explanation of alternative means is also provided.

Table 19: Aim and means of achievement for sustained control of broom

Objective, Principal Measures and Rules	
Plan Objective 6.4.3 Over the duration of the Plan, sustainably control broom and gorse to ensure land that is free of, or being cleared of, broom and gorse does not become infested, to prevent adverse effects on production values and economic well-being.	Principal measures to be used Appropriate measures drawn from the suite of activities listed under requirement to act, council inspection, collaboration, service delivery, advocacy and education, and collaboration described in section 5.3 of the Proposal may be used by Otago Regional Council to achieve Plan Objective 6.4.3. Generally, occupiers will be responsible for control of broom although Otago Regional Council may provide some assistance e.g. sourcing and releasing biological control agents. Alternatives considered Relying on voluntary action of individuals to achieve Plan Objective 6.4.3 is not considered viable due to the nature of the pest and the lack of incentives for voluntary action. Otago Regional Council could take on the responsibility for region-wide control. However, the extent of infestations is such that it is beyond the financial resources of the ratepayers. Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both occupiers and the wider community. This alternative is therefore rejected. There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.
Plan Rule 6.4.3.1 All occupiers within the Gorse and Broom Free Areas as shown on Maps 3 in Appendix 3 shall eliminate all broom infestations on the land that they occupy.	Explanation of rule The reason for this rule is to maintain the past investment by occupiers in establishing areas clear of broom within properties.

<p>This rule shall not have legal effect for the New Gorse and Broom Free Areas as illustrated on Map 2 in Appendix 3 until March 2024.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Otago Regional Council will proactively support all land occupiers within the New Gorse and Broom Free Areas to clear these areas prior to Rule 6.4.3.1 having legal effect in 2024.</p>
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Plan Rule 6.4.3.2

Note: This is designated a Good Neighbour Rule

All occupiers outside of the Gorse and Broom Free Areas on rural zoned land shall eliminate broom infestations on their land within 10m of the adjoining property boundary where the occupier of the adjoining property is eliminating broom infestations within 10m of that boundary with the intention of protecting their economic well-being.

For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to manage the spread of broom causing unreasonable costs to an adjacent occupier where active broom management is being undertaken by that land occupier.

Any action pertaining to non-compliance will only be initiated upon a complaint in writing from the adjoining affected occupier.

Plan Rule 6.4.3.3

All occupiers within the New Gorse and Broom Free Areas as shown on Map 2 in Appendix 3 shall eliminate all gorse infestations on the land that they occupy.

This rule shall not have legal effect for the New Gorse and Broom Free Areas as shown on Map 2 in Appendix 3 until March 2024.

For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to maintain the past investment by occupiers in establishing areas clear of gorse within properties.

Otago Regional Council will proactively support all land occupiers within the New Gorse and Broom Free Areas to clear these areas prior to Rule 6.4.3.3 having legal effect in 2024.

Plan Rule 6.4.3.4

Note: This is designated a Good Neighbour Rule

All occupiers outside of the Gorse and Broom Free Areas on rural zoned land shall eliminate gorse infestations on their land within 10m of the adjoining property boundary where the occupier of the adjoining property is eliminating gorse infestations within 10m of that boundary with the intention of protecting their economic well-being.

For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to manage the spread of broom causing unreasonable costs to an adjacent occupier where active broom management is being undertaken by that land occupier.

Any action pertaining to non-compliance will only be initiated upon a complaint in writing from the adjoining affected occupier.

6.4.4 Sustainable control programmes for nodding thistle and ragwort

The management aims and the range of methods to be used to accomplish the aims for nodding thistle and ragwort to be managed under the sustainable control programme in Otago is set out in Table 20 below. An explanation of alternative means is also provided.

Table 20: Aims and means of achievement for the sustainable control of nodding thistle and ragwort (boundary control)

Objective, Principal Measures and Rules	
<p>Plan Objective 6.4.4</p> <p>Over the duration of the Plan, sustainably control nodding thistle and ragwort on rural zoned land within specified distances of property boundaries throughout the Otago region to prevent their spread in order to minimise adverse effects on production values and economic well-being.</p>	<p>Principal measures to be used</p> <p>Appropriate measures drawn from the suite of activities listed under requirement to act, collaboration, council inspection, advocacy and education described in section 5.3 of the Proposal will be used by Otago Regional Council to achieve Plan Objective 6.4.4.</p> <p>Alternatives considered</p> <p>Relying on voluntary action of individuals to achieve Plan Objective 6.4.4 is not considered viable due to the nature of the pest and the lack of incentives for voluntary action. Otago Regional Council could take on the responsibility for controlling the spread of nodding thistle and ragwort. However, the extent of the infestations are such that the logistics of carrying out the control programmes would be difficult to integrate with individual property occupier management requirements. It is also unlikely to be cost effective.</p> <p>Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both occupiers and the wider community. This alternative is therefore rejected.</p> <p>There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.</p>
<p>Plan Rule 6.4.4.1</p> <p>Note: This is designated a Good Neighbour Rule</p> <p>All occupiers in the Otago region on rural zoned land shall eliminate nodding thistle infestations on their land within 100m of the adjoining property boundary where the occupier of the adjoining property is eliminating nodding thistle infestations within 100m of that boundary.</p> <p>For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to manage the spread of nodding thistle causing unreasonable costs to an adjacent occupier who is undertaking active nodding thistle management within 100m of their property boundary.</p> <p>Any action pertaining to non-compliance will only be initiated upon a complaint from the adjoining affected occupier.</p>

A breach of this rule creates an offence under section 154N(19) of the Act

Plan Rule 6.4.4.2

Note: This is designated a Good Neighbour Rule

All occupiers in the Otago region on rural zoned land shall eliminate ragwort infestations on their land within 50m of the adjoining property boundary where the occupier of the adjoining property is eliminating ragwort infestations within 50m of that boundary.

For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set viable seed.

A breach of this rule creates an offence under section 154N(19) of the Act

Explanation of rule

The reason for this rule is to manage the spread of ragwort causing unreasonable costs to an adjacent occupier who is undertaking active ragwort management within 50m of their property boundary.

Any action pertaining to non-compliance will only be initiated upon a complaint from the adjoining affected occupier.

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Act.

6.4.5 Sustainable control programme for Russell lupin

The management aims and the range of methods to be used to accomplish the aims for Russell lupin to be managed under the sustainable control programme in Otago as set out in Table 21 below. An explanation of alternative means is also provided.

Table 21: Aims and means of achievement for the sustainable control of wild Russell lupin

Objective, Principal Measures and Rules

Plan Objective 6.4.5

Over the duration of the Plan, sustainably control the extent of wild Russell lupin within specified distances from waterways to preclude establishment of wild Russell lupin and to prevent adverse effects on environmental values.

Principal measures to be used

Appropriate measures drawn from the suite of activities listed under **requirement to act, council inspection, service delivery, advocacy and education, and collaboration** described in section 5.3 of the Plan will be used to achieve Plan Objective 6.4.5.

Alternatives considered

Relying on voluntary action of individuals to achieve Plan Objective 6.4.5 is not considered viable due to the nature of the pest and the lack of incentives for voluntary action. Otago Regional Council could take on the responsibility for controlling the spread of wild Russell lupin. However, the extent of the infestation is such that it is also unlikely to be cost effective and is beyond the financial resources of Otago Regional Council.

Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both

occupiers and the wider community. This alternative is therefore rejected.

There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.

Plan Rule 6.4.5.1

Note: This is a pest agent rule

On rural zoned land within the Otago region, no wild Russell lupin shall be planted within:

- (a) 200m of the outer gravel margin of a braided river as measured at the time of planting, or if there is no outer gravel margin beyond the active channel, 200m from the edge of the active channel of a braided river;
- (b) 50m from any non-braided river;
- (c) 10m from any artificial watercourse; or
- (d) 10m from an adjoining property boundary.

A breach of this rule creates an offence under section 154N(19) of the Act.

For the purpose of this rule:

Artificial watercourse means a watercourse that is created by human action. It includes an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal channel. It does not include artificial swales, kerb and channelling or other watercourses designed to convey stormwater.

Braided river means any river with multiple, successively divergent and rejoining channels separated by gravel islands.

Non-braided river means a continually or intermittently flowing body of fresh water that is not a braided river; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity generation, and farm drainage canal).

River means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity generation, and farm drainage canal).

Explanation of rule

The reason for this rule is to prevent wild Russell lupin establishing within the specified distances from waterways and adjoining property boundaries.

Plan Rule 6.4.5.2

All occupiers on rural zoned land within the Otago region shall eliminate all wild Russell lupin within:

Explanation of rule

The reason for this rule is to prevent wild Russell lupin establishing and seeding within the

- (a) 200m of the outer gravel margin of a braided river as measured at the time of planting, or if there is no outer gravel margin beyond the active channel, 200m from the edge of the active channel of a braided river;
- (b) 50m from any non-braided river;
- (c) 10m from any artificial watercourse; or
- (d) 10m from an adjoining property boundary.

specified distances from waterways and adjoining property boundaries.

For the purpose of this rule, eliminate means the permanent preclusion of the plant's ability to set seed.

A breach of this rule creates an offence under section 154N(19) of the Act.

6.4.6 Sustained control programme for feral rabbits

The characteristics of feral rabbits to be managed under sustained control, and adverse effects that they pose, are set out in Table 22 below.

Table 22: Characteristics and threats of feral rabbits under a sustained control programme.

Description of the pests and adverse effects

Feral rabbits (wild European) are a small mammalian herbivore, grey-brown (or sometimes black) in colour ranging in length from 34 to 50cm and weighing approximately 1.1 to 2.5kg. They have a high capacity for reproduction and females may be pregnant for 70% of a year. Early-born does may breed in their natal year. They can produce a total of 20 – 50 young per adult doe. Females are also capable of adjusting litter sizes to food supply, so rabbit populations are capable of rebounding quickly from natural disasters or control pressures.



The rabbits' preferred habitat is grassland below about 1000m altitude, with free draining soils, sunny aspect, and less than 1000mm annual rainfall. They are common throughout the rural areas of the region with such habitat but may also be found in and around lifestyle blocks, rural townships and urban areas. Refer to the rabbit proneness map below (Figure 5) for more information on their distribution in Otago.



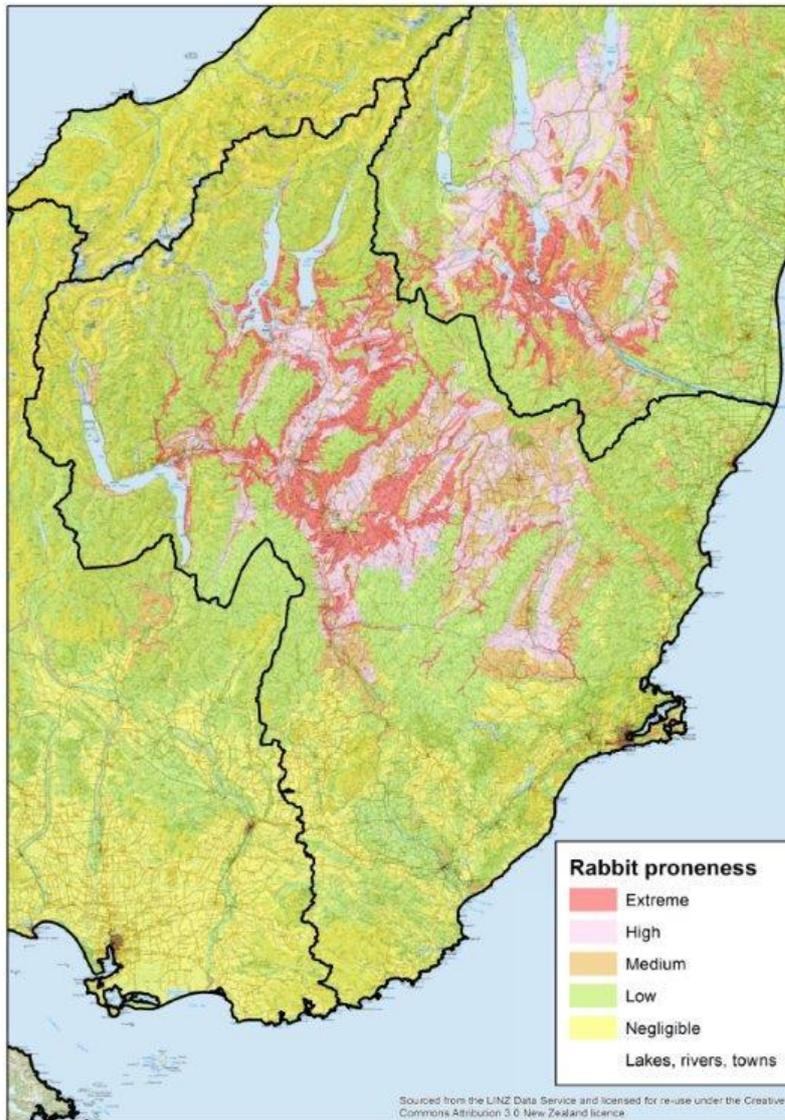
Rabbit Haemorrhagic Disease (RHD) is capable of significantly reducing population levels. However, over time, surviving populations become increasingly resistant to the disease. It is therefore important that alternative control techniques continue to be employed by land occupiers in tandem with RHD to minimise resistant build up. A further RHD strain (K5) has been released during the autumn of 2018.

In general, rabbits compete for pasture and crops with other farm animals and cause land degradation. Rabbits also graze on native vegetation, impacting ecological values. Loss of vegetation reduces soil organic matter, and soils with low organic matter have reduced water-

holding capacity and permeability, and therefore reduced soil fertility. Rabbit grazing can also cause soil erosion and stream bank erosion, which can in turn affect water quality. Rabbits may affect native invertebrates and birds by causing changes to habitat and altering predator-prey relationships.

Feral rabbits are included in the Proposal for these reasons.

Figure 5: Rabbit proneness in Otago



The management aim and the methods to be used to achieve that aim are set out in Table 23 below.

Table 23: Aim and means of achievement for sustained control of feral rabbits

Objective, Principal Measures and Rules

Plan Objective 6.4.6

Over the duration of the Plan, sustainably control feral rabbits to ensure population levels do not exceed Level 3 on the Modified McLean Scale⁴ in order to minimise adverse effects on production and environmental values within the Otago region.

Principal measures to be used

Appropriate measures drawn from the suite of activities listed under **requirement to act, council inspection, advocacy and education** described in section 5.3 of the Proposal will be used by Otago Regional Council to achieve Objective 6.4.6.

⁴ Refer Appendix 2 for Modified McLean Scale.

Exemptions may be granted in appropriate circumstances where these meet the criteria in accordance with section 78 of the Act.

Alternatives considered

Relying on voluntary action of individuals to achieve Plan Objective 6.4.6 is not considered viable due to the nature of the pest and the lack of incentives for voluntary action. Otago Regional Council could take on the responsibility for region-wide rabbit control. However, the extent of rabbit infestation is such that the logistics of carrying out the control programmes would be difficult to integrate with individual property occupier management requirements. It is also unlikely to be cost effective.

Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both occupiers and the wider community.

This alternative is therefore rejected.

There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.

Plan Rule 6.4.6.1

An occupier within the Otago region shall control feral rabbit densities on the land they occupy to at or below Level 3 on the Modified McLean Scale.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to maintain the population levels of feral rabbits to that which prevents adverse effects on the economic values of occupiers, and in so doing, prevent the possible adverse effects on wider environmental values.

Plan Rule 6.4.6.2

Note: This is designated a Good Neighbour Rule

An occupier within the Otago region shall, upon receipt of a written direction from an Authorised Person, control feral rabbit densities on their land to at or below Level 3 on the Modified McLean Scale within 500m of the adjoining property boundary where the occupier of the adjoining property is also controlling feral rabbit densities at or below Level 3 on the Modified McLean Scale within 500m of the boundary.

A breach of this rule creates an offence under section 154N(19) of the Act.

Explanation of rule

The reason for this rule is to manage the spread of feral rabbits causing unreasonable costs to the adjacent occupier where active feral rabbit management is being undertaken by that occupier.

Any action pertaining to non-compliance will only be initiated upon a complaint from the adjoining affected occupier.

Plan Rule 6.4.6.3

Other than under the instruction or supervision of an Authorised Person, no person shall discharge a firearm within or across a property where a control operation involving bait is being planned or undertaken on the property to manage feral rabbits.

Explanation of rule

The purpose of this rule is to prevent human interference prior to any necessary control operations by Otago Regional Council.

A breach of this rule creates an offence under section 154N(19) of the Act.

6.5 PESTS TO BE MANAGED UNDER SITE-LED PROGRAMMES

6.5.1 Introduction

Site-led programmes seek to manage pests whose presence, at or nearby, threaten the values that are special to particular sites (protecting the values at the place). The sites themselves can be determined in two main ways. In the first instance, there are sites within the Otago region that have already been identified through a variety of ways at a district or local scale as having particular values, primarily non-production. In the second instance, there is opportunity for individuals or community groups to promote and pursue further sites that they consider hold values of importance to those people.

Sites managed through site-led programmes may range in extent from small areas within a property to larger areas covering thousands of hectares. Likewise, their values can be threatened by individual or multiple organisms and pest management regimes specifically tailored to each site will be necessary.

This Proposal identifies three sites that manage a range of species encompassing the geographic areas of the Otago Peninsula, West Harbour – Mt. Cargill, and Quarantine and Goat Islands (Map 3 of Appendix 3).

The proposal also identified a site-led programme for the management of lagarosiphon in specified lakes and rivers (Map 5 of Appendix 3).

6.5.2 Site-Led Programmes

The **Otago Peninsula** is 9,000ha in area and stretches parallel to the Dunedin mainland along the southeast of the Otago Harbour. It joins to the mainland at its southwest end by a narrow isthmus of approximately 1.5km. The Otago Peninsula is home to a number of rare and threatened indigenous species including the yellow-eyed penguin, the New Zealand Sealion, the northern Royal Albatross, and is home to many other indigenous bird, reptile and invertebrate species. Its forest remnants are important habitats.

The **West Harbour – Mt. Cargill area** is an area of approximately 12,500ha north of Dunedin City following the western side of the Otago Harbour, extending from Mt. Cargill and Ravensbourne to Blueskin Bay, Long Beach and Aramoana. This area is home to 11 different ecosystem types containing diverse indigenous flora and fauna. This includes threatened and at-risk plant species, including nationally critical, endangered and at-risk bryophytes. The area is home to rare and threatened indigenous species including the yellow-eyed penguin, the New Zealand sea lion, and many other at-risk and threatened shore birds. It is also home to many other indigenous bird, reptile and invertebrate species, including the South Island kākā, South Island robin, and South Island fern bird.

Quarantine and Goat Islands / Kamau Taurua and Goat Island are located within the Otago Harbour between Port Chalmers within the West Harbour – Mt. Cargill area on the

western side of the harbour and Portobello on the Otago Peninsula on the eastern side of the harbour. The island provides a stepping stone between these two areas.

The **Lagarosiphon** site-led programme supports the management of lagarosiphon within Lake Wanaka and the Kawarau River, Lake Dunstan and to preclude the re-establishment of lagarosiphon in Lake Wakatipu, and to prevent spread from infested waterways to protect environmental, recreational and amenity values.

More information on these site-led areas and Otago Regional Council's role in their management is available in the proposed Biosecurity Strategy.

The following organisms are classified as pests specifically for the sites outlined above, some at only one site, some at two and the rest at all three sites.

Table 24: Pests and their applicable sites (*) being managed under site-led programmes

Common name	Scientific name	Otago Peninsula	West Harbour – Mt. Cargill	Quarantine and Goat Islands	Lagarosiphon Management Areas
Plants					
Banana passionfruit	<i>Passiflora tripartita var mollissima</i> <i>P. tripartita var azuayansis</i> <i>P. tarminiana</i> <i>P. pinnatistipula</i> <i>Passiflora x rosea</i> <i>P. caerulea</i>	*	*		
Chilean flame creeper	<i>Tropaeolum speciosum</i>	*	*		
Darwin's barberry	<i>Berberis darwinii</i>	*	*		
Sycamore	<i>Acer pseudoplatanus</i>	*	*		
Gunnera	<i>Gunnera tinctoria</i>	*			
Tradescantia (wandering willie)	<i>Tradescantia fluminensis</i>	*	*		
Lagarosiphon	<i>Lagarosiphon major</i>				*
Animals					
Bennett's wallaby	<i>Macropus rufogriseus rufogriseus</i>	*	*	*	
Feral cat	<i>Felis catus</i>	*	*	*	

Feral deer (incl. hybrids)	<i>Cervus elaphus</i> , <i>C. nippon</i> , <i>C.</i> <i>dama</i>	*	*	*
Feral goat	<i>Capra aegagrus</i> <i>hircus</i>	*	*	*
Feral pig	<i>Sus scrofa</i>	*	*	*
Hedgehog	<i>Erinaceus</i> <i>europaeus</i>	*	*	*
Mustelids (ferret, stoat, weasel)	<i>Mustelo furo</i> , <i>M.</i> <i>ermine</i> , <i>M.</i> <i>nivalis</i>	*	*	*
Possum	<i>Trichosurus</i> <i>vulpecula</i>	*	*	*
Rat (Norway, ship and Kiore)	<i>Rattus</i> <i>norvegicus</i> , <i>R.</i> <i>rattus</i> <i>R. exulans</i>			*

Note – In addition, if any other pest contained in this Proposal is present at any site, occupiers remain responsible for their management in accordance with the respective programmes outlined earlier in Chapter 6 unless the site-led programme determines otherwise.

6.5.3 Description and adverse effects of pests to be managed under site-led programmes

The characteristics of each of the pests to be managed under these programmes, and adverse effects that they pose, are set out in Table 25 below.

Table 25: Characteristics and threats of pests in site-led programmes

Description and adverse effects	
Plants	
<p>Banana passionfruit species are virtually all identical in their characteristics and appearance. They are tall, climbing vines that grow in forest and shrubland margins, stream sides, coastline cliffs, consolidated sand dunes and in domestic gardens. The plants produce large pink tubular flowers throughout the year. These develop into oval fruit that turn yellow to orange-yellow when ripe.</p> <p>This plant produces fruit that is eaten and spread by animals, birds and humans. It is capable of smothering other plants and dominating the canopy. It grows rapidly and its stems will layer. Due to this it poses adverse effects to environmental and biodiversity values of the region.</p> <p>For these reasons, it is included in the Proposal.</p>	

Chilean flame creeper is a climbing, hairless perennial, with a thick rootstock. It has slender stems with curling tendrils (<7cm long) and watery sap. The dull, soft, light green leaves have five leaflets (10-35 x 5-16mm). Solitary, tubular scarlet flowers (15mm diameter) with five irregular petals with the bottom three having a very slender claw (7-8mm long) appear from November to April. A thin, fleshy, deep blue seed capsule (1cm wide) made up of three round parts follows flowering.



Effectively dispersed by birds, established plants are moderately long-lived and develop a scrambling habit. It tolerates warm to cold temperatures, salt, wind, many soil types, and damp to dry conditions.

Within disturbed forest and shrubland, its ability to climb to canopy height and depress light levels causes smothering of bush areas and the prevention of native species establishment.

For these reasons, it is included in the Proposal.

Darwin's barberry is an evergreen, spiny, yellow-wooded shrub (less than 4m tall) with woody and densely hairy stems that have tough, 5-pronged, needle-sharp spines. Hairless, glossy, dark green leaves (10-30mm x 5-15mm) are usually spiny-serrated along edges. Hanging clusters (7cm long) of deep orange-yellow flowers (5-7mm diameter) appear from July to February followed by oval purplish-black berries (5-7mm diameter) with a bluish-white surface.



This long-lived plant tolerates moderate to cold temperatures, damp to dry conditions, high wind, salt, shade, damage, grazing (not browsed), and a range of soils. Birds and possibly possums eat the berries and subsequently spread the seeds. Berries are also occasionally spread by soil and water movement.

It is capable of invading pasture, disturbed forest, shrubland, tussockland, along roadsides and other sparsely vegetated sites. The plant forms dense colonies that replace existing vegetation and prevent the establishment of desirable plants. Darwin's barberry will also establish under canopy in forest and shrubland. It can grow more rapidly than native species when suitable conditions arise, allowing it to dominate sites where it establishes.

For these reasons, it is included in the Proposal.

Gunnera is a large, clump-forming, summer-green herb (up to 2m) growing from stout horizontal rhizomes with large sized leaves (80 cm x 1 m) on sturdy stalks. Both leaves and leaf stalks are covered in rubbery red prickles. Gunnera dies down over winter in cold climates and grows new leaves in spring from large, lobed, scaly buds (25 cm long) that are pinkish-green when fresh and dry to brown. It produces small densely packed green flowers in summer on long, erect, conical spikes which develop into reddish, oblong fruit (1.5-2mm long), each containing a single oblong seed.



Source: Weedbusters

It is known in other regions in New Zealand to shade out other plants, form dense stands/clumps and to spread to bluffs, wet cliffs and near waterways. It is present on the Otago Peninsula.

For these reasons, it is included in the Proposal.

Sycamores are a deciduous tree (<20m tall) with smooth grey bark and hairless green shoots. Large buds (<5cm long) have pinkish inner scales. Bluish-green 5-lobed leaves (8-14 x 10-20cm) are in opposite pairs on reddish stems. Flowerheads (October-November) are narrow drooping clusters (5-15cm long) of many dense, green flowers (2-4mm long), followed by reddish, winged, 'helicopter' seed capsules (2-4cm long) containing two seeds (5-10mm long).



Source: Environment Southland

The plant is persistent and forms dense (often pure) stands. Produces many long-lived seeds that are well dispersed by wind and water. Seedlings are shade tolerant. It tolerates warm to very cold, moist to dry, most soils, wind and salt. Possibly able to release toxins into the soil to stop other plants growing near it.

It invades disturbed and intact forest and shrubland, short tussockland, fern-land, river systems and bare land. The dense stands prevent recruitment of other species.

For these reasons, it is included in the Proposal.

Tradescantia (wandering willie) is a trailing, soft, hairless, perennial groundcover with succulent, soft, creeping stems that root at all nodes touching the ground. Dark green, shiny, smooth and slightly fleshy leaves (3-6cm long) are oval with pointed tips. White flowers (2cm diameter) produced from December to January are 3-petaled and in small clusters. No fruit or seed is produced in New Zealand. It rapidly establishes from fragments.



The plant is very tolerant of dense shade, severe damage and grazing, wet, most soil types and high to low temperature, but intolerant of frost and drought. Stem fragments are spread by water movement, livestock, dumped vegetation, soil movement, boots and mowers.

The plant invades most damp shaded habitats, especially disturbed and previously grazed forest, shrubland, stream sides, river systems, alluvial

terraces, fern-land, wetlands, and anywhere downstream or adjacent to existing infestations. It smothers ground in light to deep shade, preventing the seedlings of native species from establishing. Causes habitats to open and be invaded by exotic shrubs and vines. Mats growing on riverbanks can break away with water flow and contribute to flooding.

For these reasons, it is included in the Proposal.



Lagarosiphon is a submerged, bottom-rooted perennial, which can form monospecific growths up to 5m tall upon reaching the water surface. The leaves are dark green (16 x 2mm) and have minute serrations along the edges. They are arranged spirally around the stem and are curved backwards or downwards. Tiny pinkish flowers are produced, but, as only female plants are found in New Zealand, no seed is set. It propagates through stem fragments being carried on water currents, boats, fishing gear, aquarium and pond escapes and deliberate planting.

This plant is present in Lakes Dunstan and Roxburgh and parts of Lake Wanaka. It is also present in the Clutha River/Mata-Au and the Kawarau River. Isolated, individual plants are regularly removed from Frankton Arm in Lake Wakatipu, which is thought to be a result of weed transfer by boats from other waterways in the region.

This plant is a potential threat to the aquatic environment because its vigorous growth displaces and shades out aquatic native plants. Dense areas of lagarosiphon may impede water flows and cause local deoxygenation of water. Aesthetic values, recreational activities (such as boating, water-skiing and swimming), and water supply intakes may all be adversely affected where lagarosiphon chokes and blocks water bodies. If lagarosiphon is left uncontrolled, large beds can form, come adrift and leave unsightly heaps on the shore.



Source: NIWA



Animals

Bennett's wallaby – see pest description in section 6.2.2 of the Proposal, Eradication Programmes.



Feral cats resemble domestic cats in both size and colouration. Adult male cats are generally larger than the females and can weigh up to 5kg. They tend to be solitary and territorial compared to domestic stray or unwanted cats that tend to form colonies. Feral cats are mainly active at night.

Feral cats inhabit a wide range of urban, rural and forest habitats. Diet is wide-ranging and includes small mammals, fish, birds and invertebrates. They have 2-3 litters per year with an average of 4 young in each.

Feral cats have been branded as 'the ultimate predators' in New Zealand and have been nominated as among 100 of the "World's Worst" invaders. New Zealand's unique native wildlife is particularly vulnerable to predation by cats. Feral cats kill young and adult birds and occasionally take eggs, prey on native lizards, fish, frogs and large invertebrates.

Feral cats are implicated in a small way in the spread of Bovine Tuberculosis, with the potential to infect cattle. They also carry parasites and toxoplasmosis that causes abortions in sheep and illness in humans.

Feral and stray cats can be aggressive towards pet cats. Through fighting they cause severe injuries, sometimes resulting in the pet cat having to be put down. Stray cats are likely to interbreed with the unneutered domestic cat population and may spread infectious diseases.

For these reasons, they are included in the Proposal.



Source: Environment Southland



Source: DOC

Feral deer are medium to large-sized ungulates ranging in weight from 40kg (female white tailed) to 450kg (wapiti male). Red deer have a reddish-brown coat, while wapiti are chestnut brown with a distinctive cream rump. The coats of samba are dark brown with a tan-rust red rump, while rusa are dark reddish-brown. Sika deer have a black dorsal stripe, white rump, chestnut brown sides with white spots. The coats of white tailed deer are light brown with white undersides and rump. Fallow deer have coats of varying brown colours.



Source: DOC

Feral deer live in a wide range of habitats, particularly forest. They consume large quantities of native seedlings and saplings which reduces vegetation biomass and leads to failure in recruitment of a range of woody and herbaceous species and alters habitat for native fauna.

Heavy and selective browsing on trees and shrubs can change forest structure and the composition of the understorey. Palatable plant species such as schefflera/pate, broadleaf, three-finger, lancewood, and hen and chicken fern can be all but removed from the ground tier. Sika deer often target species considered unpalatable to other deer.

They are included in the Proposal for the above reasons.

Feral goats are sheep-sized animals with short hair, pointed horns and a beard. Colour can be white, black, brown or a combination of these. Males average 39kg, are about 680mm tall and about 1.3m long. Females average 30kg, are about 620mm tall with a body length of 1.2m. Their hooves are leaved with pointed, slightly incurved tips and their eyes are greenish blue.



Source: DOC

They are social animals, disperse slowly, and do not voluntarily cross large rivers. This results in patchy distribution. However, their high birth rates, when in good condition, enable population size to roughly double every two years. The major cause of mortality is hunting, although feral pigs may prey on young goats.

Goats are browsing generalists and feed on woody species in forests. Feral goats impact on indigenous ecosystems through their concentrated browsing and trampling. Even in low numbers, their impacts on forest and scrublands can be serious – they destabilise forest ecosystems, and defoliate and eat the stems of palatable under-storey species, bark saplings, and prevent regeneration of seedlings. Unpalatable shrubs increase, and on some islands, forest ecosystems have been converted to grassland.

Feral goats have few economic impacts, although they may occasionally compete with sheep for feed, and they have a wide range of parasites and diseases in common with sheep. Their range is limited however, and they are controlled relatively easily, so it is not considered that they have any significant economic impact.

They are included in the Proposal for their adverse effects on indigenous ecosystems.

Feral pigs can measure 90-200cm in length and weigh 50-90kg. Their colour varies from dark grey to brown or black. Adult males develop tusks that protrude from their mouth. Sexually mature at two years of age, they breed once per year with litter size ranging from 4-6 piglets. Vegetation forms 70% of a pig's diet. Pig rooting can reduce the diversity of seedlings and saplings and cause a dramatic reduction in leaf cover on the forest floor.



Source: Environment Southland

Feral pigs can have major effects on native flora and fauna. They eat the tops of native plants and dig up their roots, resulting in the decline of some species. Also eaten are many native invertebrates, native land snails and large quantities of native earthworms. Pig predation of flightless and ground-dwelling birds (e.g. kiwi) has been suggested but rarely confirmed.

They are included in the Proposal for their adverse effects on indigenous ecosystems.

Hedgehogs are nocturnal insectivores. Their back and sides are completely covered with spines and they roll into a prickly ball when disturbed, or when hibernating. They are widespread through lowland areas, occupying a wide range of habitats.



Source: DOC

These animals eat mainly insects however they eat a wide range of food if the opportunity presents itself. They are a potentially serious predator of native invertebrates, lizards, and ground nesting birds.

They are included in the Proposal for their adverse effects on indigenous ecosystems.

Mustelids (ferrets, stoats, weasels) are small to medium sized carnivores with large home ranges. Ferrets are the largest of the three. Male ferrets grow up to 44cm and females up to 37cm in length. The undercoat is creamy yellow with long black guard hairs that give the ferret a dark appearance. A characteristic black face mask occurs across the eyes and above the nose. Stoats have long, thin bodies with smooth pointed heads. Ears are short and rounded. Males grow up to 30cm and females up to 25cm in length. Their fur is reddish-brown above with a white to yellowish underbelly. Stoats have relatively long tails with a distinctive bushy black tip. Weasels are the smallest and least common mustelid. Males grow to about 20cm. Their fur is brown with white undercoat, often broken by brown spots. Their tails are short, brown and tapering.



Although habitat loss and modification remain the most serious threat to native biodiversity, introduced predators, such as ferrets, stoats, and weasels also pose a significant threat. Mustelids are implicated in the extinction of some indigenous bird species and as the major cause of decline of many others. Ferrets are also a threat to agriculture, particularly through their role as a vector (carrier) of Bovine Tuberculosis. Mustelids are a threat to poultry farms and carry parasites and

toxoplasmosis, which can cause illness in humans and livestock.

They are included in the Proposal for their adverse effects on indigenous ecosystems.



Source: DOC

Possums are marsupials and the males and females are similar in size; between 650 and 930mm, including a tail of 250 to 405mm. They weigh between 1.4 and 6.4kgs, have a furry body, a long prehensile, bushy tail, a pointed snout, pink nose, long dark whiskers and brown eyes. Possums begin breeding at one to two years of age and juveniles disperse an average of 6km from their home range. Primarily herbivores, they feed on a variety of leaves, flower buds, fruit, ferns, and fungi. They feed also on invertebrates and opportunistically on the eggs and nestlings of birds.

Therefore, they cause extensive defoliation of favoured plant species and progressive change in forest composition to less favoured species occurs. Damage is not however uniform across habitats. Possums can also impact native animals by predation of insect species, snails, and birds.

Possums cause economic effects by damaging exotic forests, eating pasture, and through the spread of Bovine Tuberculosis. However, the possum browsing on pasture is likely to be a minor problem apart from pasture/bush margins. Possums can also damage winter feed and other crops especially on bush/pasture margins. The damage to exotic forests tends to be limited but they are known to damage tree crops and domestic gardens.

Possums are included in the Proposal to address adverse effects to conservation values and to protect the past economic investment Bovine Tuberculosis control. There is evidence to support the link between possums and Tuberculosis in farmed animals. Recent studies show that cattle and deer may lick and nuzzle Tuberculosis-infected possums in the terminal stages of the disease as the possums wander around open ground in daylight.



Source: DOC

Rat (Norway, ship and Kiore)

Ship rat is a slender rat with large hairless ears, grey-brown on the back with a similarly coloured or creamish-white belly, or black all over. Adults usually weigh 120-160g but can exceed 200g.

Norway rat has brown fur on its back and pale grey fur on its belly. Adults normally weigh 150-300g, may reach up to 500g, and are up to 390mm long. Tail is shorter than head-body length. Breeding commences as early



as 3-4 months of age. Females can produce 15-20 young per year.

Kiore has brown fur, white-tipped grey fur on belly, pale feet with dark mark on outer edge of the hind feet. They are smaller than other rats in New Zealand, with a maximum body length of 180mm without tail, and they usually weigh 60g - 80g, maximum 180g.

They occupy a wide range of urban, rural and forest habitats. Ship rats are more common within forest areas.

Omnivorous and opportunistic feeders eating 10% of their body weight per day. This makes them a competitor for food with many species and predators of others. They eat a variety of native flora and fauna, in particular native birds (eggs and fledglings), lizards, and invertebrates. They eat large quantities of native seeds, which reduces regeneration of native plants.

They are included in the Proposal because of these adverse effects.



Source: Environment Southland

6.5.4 Site-led programmes on the Otago Peninsula

The management aims and the range of methods to be used to accomplish the aims for the pest to be managed under the site-led programme for the Otago Peninsula are set out in Table 26 below. An explanation of alternative means is also provided.

Table 26: Aims and means of achievement for site-led programmes on the Otago Peninsula

Objective, Principal Measures and Rules	
<p>Plan Objective 6.5.4.a Over the duration of the Plan:</p> <ul style="list-style-type: none"> a) preclude establishment of feral deer, feral goats, feral pigs and Bennett's wallaby; and b) eradicate possums; and c) sustainably control feral cats, hedgehogs and mustelids <p>on the Otago Peninsula (identified on Map 3, Appendix 3) to avoid, mitigate or prevent damage to the indigenous ecosystem values at this site.</p> <p>Plan Objective 6.5.4.b Over the duration of the Plan, progressively contain:</p> <ul style="list-style-type: none"> a) banana passionfruit; b) Chilean flame creeper; c) Darwin's barberry; d) Sycamore e) Gunnera; and 	<p>Principal measures to be used</p> <p>Otago Regional Council will take a lead role in supporting community groups and agencies in bringing about the desired levels of environmental protection to this site.</p> <p>Appropriate measures drawn from the suite of activities listed under collaboration, requirement to act, council inspection, service delivery, advocacy and education described in section 5.3 of the Proposal will be used by Otago Regional Council to achieve Objectives 6.5.4 and 6.5.5.</p> <p>It is not proposed to introduce occupier control responsibilities at this stage. However, this may become necessary in the future to maintain public investment of actions or funding or where lack of cooperation could jeopardise achieving the Objectives.</p> <p>How the Otago Regional Council intends to deliver these objectives with the community is described more fully in Section 3 of the proposed Biosecurity Strategy.</p>

<p>f) tradescantia on the Otago Peninsula (identified on Map 3, Appendix 3) to avoid, mitigate or prevent damage to the indigenous ecosystem values at this site.</p>	<p>Alternatives considered</p> <p>Relying solely on voluntary action without Otago Regional Council support to achieve Plan Objectives 6.5.4.a and 6.5.4.b is not considered viable due to the nature of the pests, the scale of the programme, the effectiveness of voluntary action and the need for a collaborative inter-agency approach, especially given that the beneficiaries of control action lies with the wider community.</p> <p>It is likely that Otago Regional Council does not have the financial resource to fully fund the programmes. Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both occupiers and the wider community. This alternative is therefore rejected.</p> <p>There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.</p>
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<p>Plan Rule 6.5.4.1</p> <p>No person shall keep, hold, enclose or otherwise harbour in any place, either in transit to or present on the Otago Peninsula (identified on Map 3 in Appendix 3) any:</p> <ul style="list-style-type: none"> a) Bennett's wallaby; b) feral deer; c) feral goat; d) feral pig; e) mustelid; f) hedgehog; or g) possum. <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p> <p>For the purpose of this rule place includes any building, conveyance, craft, land, or structure.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to help achieve the exclusion or eradication of these pests from the Otago Peninsula.</p>
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Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Biosecurity Act 1993.

6.5.5 Site-led programmes at West Harbour – Mt. Cargill area

The management aims and the range of methods to be used to accomplish the aims for the pest to be managed under the site-led programme at West Harbour – Mt. Cargill are set out in Table 27 below. An explanation of alternative means is also provided.

Table 27: Aims and means of achievement for site-led programmes at West Harbour – Mt. Cargill

Objective, Principal Measures and Rules	
<p>Plan Objective 6.5.5.a</p> <p>Over the duration of the Plan:</p> <ul style="list-style-type: none"> a) preclude establishment of feral deer and Bennett's wallaby; and b) sustainably control feral cats, feral goats, feral pigs, hedgehogs and mustelids; and c) progressively contain possums to achieve a 2% RTC <p>at West Harbour – Mt. Cargill (identified on Map 3 in Appendix 3) to avoid, mitigate or prevent damage to the indigenous ecosystem values at this site.</p> <p>Plan Objective 6.5.5.b</p> <p>Over the duration of the Plan, progressively contain:</p> <ul style="list-style-type: none"> a) banana passionfruit; b) Chilean flame creeper; c) sycamore; d) Darwin's barberry; and e) tradescantia <p>at West Harbour – Mt. Cargill (identified on Map 3 in Appendix 3) to avoid, mitigate or prevent damage to the indigenous ecosystem values at this site.</p>	<p>Principal measures to be used</p> <p>Otago Regional Council will take a lead role in supporting community groups and agencies in bringing about the desired levels of environmental protection to this site.</p> <p>Appropriate measures drawn from the suite of activities listed under collaboration, requirement to act, council inspection, service delivery, advocacy and education described in section 5.3 of the Proposal will be used by Otago Regional Council to achieve Objectives 6.5.5.a and 6.5.5.b.</p> <p>It is not proposed to introduce occupier control responsibilities at this stage. However, it may become necessary in the future to maintain public investment of actions or funding or where lack of cooperation could jeopardise achieving the Objectives.</p> <p>How the Otago Regional Council intends to deliver these objectives with the community is described more fully in Section 3 of the proposed Biosecurity Strategy.</p> <p>Alternatives considered</p> <p>Relying solely on voluntary action without Otago Regional Council support to achieve Plan Objectives 6.5.5.a and 6.5.5.b is not considered viable due to the nature of the pests, the scale of the programme, the effectiveness of voluntary action and the need for a collaborative inter-agency approach, especially given that the beneficiaries of control action lies with the wider community.</p> <p>It is likely that Otago Regional Council does not have the financial resource to fully fund the programmes. Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both occupiers and the wider community. This alternative is therefore rejected.</p> <p>There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.</p>
<p>Plan Rule 6.5.5.1</p> <p>No person shall keep, hold, enclose or otherwise harbour in any place, either in transit to or present at West Harbour – Mt. Cargill (identified on Map 3 in Appendix 3) any</p> <ul style="list-style-type: none"> a) Bennett's wallaby; b) feral deer; 	<p>Explanation of rule</p> <p>The reason for this rule is to help achieve the exclusion, eradication or control of these pests from West Harbour – Mt. Cargill.</p>

- c) feral goat;
- d) feral pig;
- e) mustelid;
- f) hedgehog; or
- g) possum.

A breach of this rule creates an offence under section 154N(19) of the Act.

For the purpose of this rule place includes any building, conveyance, craft, land, or structure.

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Biosecurity Act 1993.

6.5.6 Site-led programmes on Quarantine and Goat Islands

The management aims and the range of methods to be used to accomplish the aims for the pest to be managed under site-led programmes at Quarantine and Goat Islands are set out in Table 28 below. An explanation of alternative means is also provided.

Table 28: Aims and means of achievement for site-led programmes on Quarantine and Goat Islands

Objective, Principal Measures and Rules	
<p>Plan Objective 6.5.6</p> <p>Over the duration of the Plan:</p> <ul style="list-style-type: none"> a) preclude establishment of Bennett's wallaby, feral cats, feral deer, feral goats, feral pigs, mustelids, hedgehogs⁵ and possums; and b) eradicate rats <p>on Quarantine and Goat Islands (identified on Map 3 in Appendix 3) to avoid, mitigate or prevent damage to the indigenous ecosystem values at this site.</p>	<p>Principal measures to be used</p> <p>Otago Regional Council will take a lead role in supporting community groups and agencies in bringing about the desired levels of environmental protection to this site.</p> <p>Appropriate measures drawn from the suite of activities listed under collaboration, requirement to act, council inspection, service delivery, advocacy and education described in section 5.3 of the Proposal will be used by Otago Regional Council to achieve Objective 6.5.6.</p> <p>It is not proposed to introduce occupier control responsibilities at this stage. However, it may become necessary in the future to maintain public investment of actions or funding or where lack of cooperation could jeopardise achieving the objectives.</p> <p>How the Otago Regional Council intends to deliver these objectives with the community is described more fully in Section 3 of the proposed Biosecurity Strategy.</p>

⁵ Existing information suggests that hedgehogs are not present on Goat Island, however if further research demonstrates that they are, then the objective for hedgehogs on Goat Island will be eradication.

Alternatives considered

Relying solely on voluntary action without Otago Regional Council support to achieve Plan Objective 6.5.6 is not considered viable due to the nature of the pests, the scale of the programme, the effectiveness of voluntary action and the need for a collaborative inter-agency approach, especially given that the beneficiaries of control action lies with the wider community.

It is likely that Otago Regional Council does not have the financial resource to fully fund the programmes. Furthermore, the consequences of occupiers no longer owning the problem could lead to over-optimistic expectations on the part of both occupiers and the wider community. This alternative is therefore rejected.

There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.

Plan Rule 6.5.6.1

No person shall keep, hold, enclose or otherwise harbour in any place, either in transit to or present on Quarantine and Goat Islands (identified on Map 3 in Appendix 3) any:

- a) Bennett's wallaby;
- b) feral cat;
- c) feral deer;
- d) feral goat;
- e) feral pig;
- f) mustelid;
- g) hedgehog;
- h) possum; or
- i) rat.

A breach of this rule creates an offence under section 154N(19) of the Act.

For the purpose of this rule place includes any building, conveyance, craft, land, or structure.

Explanation of rule

The reason for this rule is to help achieve the exclusion or eradication of these pests from Quarantine and Goat Islands.

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Biosecurity Act 1993.

6.5.7 Site-led programme for lagarosiphon management areas

The management aims and the range of methods to be used to accomplish the aims for lagarosiphon to be managed under site-led programmes within the lagarosiphon management areas are set out in Table 29 below. An explanation of alternative means is also provided.

Table 29: Aims and means of achievement for site-led programmes for lagarosiphon management areas

Objective, Principal Measures and Rules	
<p>Plan Objective 6.5.7</p> <p>Over the duration of the Plan actively manage lagarosiphon to:</p> <ul style="list-style-type: none"> a) progressively contain lagarosiphon in Lake Wanaka and the Kawarau River (Map 5 in Appendix 3) to reduce its extent over the next 10 years; b) sustainably control lagarosiphon in Lake Dunstan (Map 5 in Appendix 3); c) preclude the establishment of lagarosiphon in Lake Wakatipu (Map 5 in Appendix 3); d) preclude the establishment of lagarosiphon in lakes and rivers excluding Lake Roxburgh and the Clutha River/Mata-au and its tributaries where it is not already present <p>to avoid, mitigate or prevent effects on the environment, and amenity and recreational values.</p>	<p>Principal measures to be used</p> <p>Land Information New Zealand will take a lead role in controlling and eradicating lagarosiphon in Otago’s lakes and rivers that it administers. Otago Regional Council will work collaboratively with Land Information New Zealand and other partners in the preparation, administration and delivery of 10-year Management Plans for the control of lagarosiphon and in other initiatives to deliver the outcomes in the objectives.</p> <p>Land occupiers will be responsible for eradicating lagarosiphon within private ponds and aquariums.</p> <p>The requirement to act, service delivery, advocacy, education, and collaboration described in section 5.3 of the Plan, will be used primarily to achieve Plan Objective 6.5.7.</p> <p>How the Otago Regional Council intends to support the delivery of these objectives with Land Information New Zealand is described more fully in Section 3 of the Proposed Biosecurity Strategy.</p> <p>Alternatives considered</p> <p>Otago Regional Council could take on the total responsibility for controlling lagarosiphon. However, Land Information New Zealand is the land occupier of most lakes and rivers in Otago that are affected by lagarosiphon. Relying on voluntary individual action to minimise adverse impacts of lagarosiphon would not be effective due to limited available incentives to do so and the associated risk of spread. These two alternatives are therefore rejected.</p> <p>There are no alternative measures that provide for satisfactory inspection, education or advocacy measures.</p>
<p>Plan Rule 6.5.7.1</p> <p>Any person leaving the waters of Lakes Dunstan, Wanaka or Roxburgh or from the Clutha River/Mata-Au and the Kawarau River must immediately remove and safely dispose of all fragments of lagarosiphon from boats, equipment and all other items in their possession.</p> <p>A breach of this rule creates an offence under section 154N(19) of the Act.</p>	<p>Explanation of rule</p> <p>The reason for this rule is to protect waterbodies not currently infested with lagarosiphon from becoming infested and threatening environmental and recreational values.</p>
<p>Plan Rule 6.5.7.2</p>	<p>Explanation of rule</p> <p>The reason for this rule is to protect waterbodies not currently infested with lagarosiphon from</p>

Occupiers must destroy and safely dispose of all lagarosiphon in any pond or aquarium on their land. becoming infested and threatening environmental and recreational values.

A breach of this rule creates an offence under section 154N(19) of the Act.

Advice Note

Sections 52 and 53 of the Biosecurity Act 1993, which prevent the communication, release, spread, sale and propagation of pests, must be complied with. These sections should be referred to in full in the Biosecurity Act 1993.

6.5.8 Adding new site-led programmes to the Plan

The process that will be followed for adding a new site-led programme to the Plan is dependent on whether the programme will have effect on a person's rights or obligations.

If such effects are not significant, the Plan may be amended by Council resolution to include the site in accordance with section 100G of the Act. For example, where minimal regulation is required and there is substantial support among the parties for its inclusion. Guidelines setting out how site-led programmes may be included in the Plan by Council resolution are provided in Appendix 2 of the Proposed Biosecurity Strategy.

In cases where such effects are considered to be significant, the addition will be by a more comprehensive process including appropriate consultation, notification and appeal provisions as required under the Act.

7. MONITORING

7.1 MEASURING WHAT THE OBJECTIVES ARE ACHIEVING

Anticipated result	Indicator	Method of monitoring	Frequency of monitoring	Reporting to Council
Exclusion Programmes				
Absence of African feather grass, Chilean needle grass, false tamarisk and moth plant from the region	Absence in the Otago region	Reporting by occupiers or other persons	As reported	Annual
		Surveillance programmes	Annual surveillance programme	Annual
Eradication Programmes				
All spiny broom removed	Absence of spiny broom in the Otago region	Population assessment based on inspections	Annual inspection programme	Annual
		Reporting by occupiers or other persons	As reported	Annual
All rooks destroyed	Absence of rooks in the Otago region	Population assessment based on rookery inspections	Annual inspection programme	Annual
		Reporting by occupiers or other persons	As reported	Annual
All Bennett's wallaby destroyed	Absence of Bennett's wallaby in the Otago region	Population assessment based on inspections	Annual / as appropriate inspection programme	Annual and as appropriate
		Reporting by occupiers or other persons	As reported	Annual and as appropriate
Progressive Containment Programmes				
The spatial reduction of African love grass, bomarea, boneseed, bur daisy, cape ivy, nassella tussock, old man's beard, perennial nettle, spartina, and	Annual decrease in plant population on high risk land	Population assessment as a result of inspection activities	Annual inspection programme	Annual

white-edged
nightshade over
the life of the Plan.

The spatial reduction of wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch over the life of the Plan.	Control and maintenance is undertaken as part of the National Wilding Conifer Control Programme	Population assessment as a result of inspections in accordance with the National Wilding Conifer Control Programme	Annual inspection programme	Annual
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Sustained Control Programmes

Gorse and broom does not spread between properties and to gorse and broom free areas	Absence adjacent to boundary fences	Boundary monitoring for presence / absence in response to complaint	Pre and post control operations	Annual
	Gorse and broom is excluded from gorse and broom free areas	Aerial monitoring	Every 2 years (may be more frequent for transitional gorse and broom free areas)	Every 2 years (may be more frequent for transitional gorse and broom free areas)
Nodding thistle and ragwort does not spread between properties where this affects production values on adjacent properties	No spread to adjoining properties	Boundary monitoring for presence / absence in response to complaint	Pre and post control operations	Annual
Russell lupin and wild Russell lupin	No presence within specified distances to waterways	Boundary monitoring for presence / absence in high risk areas	Pre and post control operations	Annual

Site Led Programmes

Support the management and control of lagarosiphon in lagarosiphon management areas	Lagarosiphon extent within lagarosiphon management areas does not spread and absence of lagarosiphon in Lake Wakatipu	presence / absence	As reported by lagarosiphon management groups, and Otago Regional Council where required – annual minimum	Annual
Support the management and control of pests	The reduction of pests within the Otago Peninsula,	Predator Free Dunedin and Otago Regional	As reported by Predator Free Dunedin and	Annual

occupying the Otago Peninsula, West Harbour – Mt. Cargill and Quarantine and Goat Islands site-led areas	West Harbour – Mt. Cargill and Quarantine and Goat Islands site-led areas	Council monitoring of boundaries and densities	Otago Regional Council where required – annual minimum
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7.2 MONITORING THE MANAGEMENT AGENCY'S PERFORMANCE

Otago Regional Council is the management agency. As the management agency responsible for implementing the Plan, the Otago Regional Council will:

- a. prepare an operational plan within three months of the Plan being approved;
- b. review the operational plan, and amend it if needed;
- c. report on the operational plan each year, within five months after the end of each financial year;
- d. maintain up-to-date databases of complaints, pest levels and densities, and responses from regional council and land owners and/or occupiers.

7.3 MONITORING PLAN EFFECTIVENESS

Monitoring the effects of the Plan will ensure that it continues to achieve its purpose. It will also check that relevant circumstances have not changed to such an extent that the Plan requires review. A review may be needed if:

- a. the Act is changed, and a review is needed to ensure that the Plan is not inconsistent with the Act;
- b. other harmful organisms create, or have the potential to create, problems that can be resolved by including those organisms in the Plan;
- c. monitoring shows the problems from pests or other organisms to be controlled (as covered by the Plan) have changed significantly; or
- d. circumstances change so significantly that Otago Regional Council believes a review is appropriate.

If the Plan does not need to be reviewed under such circumstances, it will be reviewed in line with section 100D of the Act. Such a review may extend, amend or revoke the Plan, or leave it unchanged.

The procedures to review the Plan will include officers of the Otago Regional Council:

- a. assessing the efficiency and effectiveness of the principal measures (specified for each pest and other organism (or pest group or organisms)) to be controlled to achieve the objectives of the Plan;
- b. assessing the impact the pest or organism (covered by the Plan) has on the region and any other harmful organisms that should be considered for inclusion in the Plan; and
- c. liaising with statutory authorities and key interest groups on the effectiveness of the Plan.

PART THREE: PROCEDURES



8. POWERS CONFERRED

8.1 POWERS UNDER PART 6 OF THE ACT

The Principal Officer (Chief Executive) of Otago Regional Council may appoint authorised persons to exercise the functions, powers and duties under the Act in relation to the Plan.

Otago Regional Council will use those statutory powers of Part 6 of the Act as shown in Table 30, where necessary, to help implement the Plan.

Table 30: Powers to be used from Part 6 of the Act

Administrative provisions	Biosecurity Act Reference
The appointment of authorised and accredited persons	Section 103(3) & (7)
Authorised person to comply with instructions	Section 104(2)
Delegation to authorised persons	Section 105
Power to require assistance	Section 106
Power of inspections and duties	Section 109, 110 112
Duties on exercising powers under section 110 and section 111	Section 112
Power to record information	Section 113
General powers	Section 114 & 114A
Use of dogs and devices	Section 115
Seizure of evidence (under section 111)	Section 118
Power to intercept risk goods	Section 120
Power to examine organisms and apply substances	Section 121 & 121A
Power to give directions	Section 122
Power to vaccinate	Section 123
Power to act on default	Section 128
Liens	Section 129
Declaration of restricted areas	Section 130
Declaration of controlled areas	Section 131
Duration of place and area declarations	Section 133
Enforcement of area controls	Section 134
Options for cost recovery	Section 135
Failure to pay	Section 136

Note: Otago Regional Council's procedures sets out the procedures it will follow when land owners and/or occupiers or other persons do not comply with the rules or other duties.

8.2 POWERS UNDER OTHER SECTIONS OF THE ACT

Any person in breach of a rule in the Plan that specifies that a contravention of the rule creates an offence under section 154N(19) of the Act, can be prosecuted and is liable on conviction under section 157(5) of the Act to a fine.

The Principal Officer (Chief Executive) of Otago Regional Council or Chief Technical Officer (employed under the State Sector Act 1988) may appoint authorised people to implement other biosecurity law considered necessary. One example is where restrictions on selling, propagating and distributing pests (under sections 52 and 53 of the Act) must be enforced. Another example is where owners and/or occupiers of land are asked for information (under section 43 of the Act).

8.3 POWER TO ISSUE EXEMPTIONS TO PLAN RULES

Any person may upon representation to Otago Regional Council be exempt from a requirement in a rule set out in Part Two of the Proposal.

The requirements in section 78 of the Act must be met for a person to be granted an exemption. These include:

2. *The council may grant an exemption under subsection (1) only if—*
 - a. *the council is satisfied that granting the exemption will not significantly prejudice the attainment of the plan's objectives; and*
 - b. *the council is satisfied that 1 or more of the following applies:*
 - i. *the requirement has been substantially complied with and further compliance is unnecessary;*
 - ii. *the action taken on, or provision made for, the matter to which the requirement relates is as effective as, or more effective than, compliance with the requirement;*
 - iii. *the requirement is clearly unreasonable or inappropriate in the particular case;*
 - iv. *events have occurred that make the requirement unnecessary or inappropriate in the particular case.*
3. *The council may exempt all persons, a specified class of persons, persons in a specified place, or persons responsible for specified goods or things from a requirement in a rule, without conditions or on conditions that the council considers appropriate.*
4. *The council may grant an exemption under subsection (3) only if the council is satisfied that events have occurred that make the requirement unnecessary or inappropriate.*

5. *Conditions on which the council grants an exemption must be consistent with the purpose of this Part and must be no more onerous than the requirement from which the exemption is granted.*
6. *The council must determine the period of an exemption that the council grants.*

Otago Regional Council will keep and maintain a register of exemptions granted that records the description, reasons and period of each exemption. The public will be able to inspect this register free of charge during business hours. Otago Regional Council may also grant an extension of the period of an exemption.

9. FUNDING

9.1 INTRODUCTION

The Act requires that funding is thoroughly examined. For a Proposal, this includes:

- analysing the costs and benefits of the Plan and any reasonable alternative measures;
- noting how much any person will likely benefit from the Plan;
- noting how any person's actions or inactions may contribute to creating, continuing or making worse the problems that the Plan proposes to resolve;
- noting the reason for allocating costs; and
- noting whether any unusual administrative problems or costs are expected in recovering the costs from any person who is required to pay.

The proposal is also required to specify:

- a. *the effects that, in the opinion of the person making the proposal, implementation of the plan would have on—*
 - i. *economic wellbeing, the environment, human health, enjoyment of the natural environment, and the relationship between Māori, their culture, and their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga;*
 - ii. *the marketing overseas of New Zealand products; and*
- b. *if the plan would affect another pest management plan or a pathway management plan, how it is proposed to coordinate the implementation of the plans.*

9.2 ANALYSIS OF BENEFITS AND COSTS

The Act and its accompanying NPD demand a rigorous analysis of benefits and costs. In order to satisfy the requirements, Otago Regional Council commissioned a report, *Meeting the requirements of the Biosecurity Act 1993 and National Policy Direction for Pest Management 2015: Analysis of costs and benefits* (the CBA Report).

In general, the quantified net benefits consist of the costs of implementing the Plan and the production benefits arising from this action. These are calculated as net present values using a six percent discount rate and a timeframe of 100 years (NPV (6%)). In some situations, it is not always possible or cost effective to accurately monetise benefits and costs. Examples of these non-quantified benefits include mana whenua, biodiversity, recreation, and amenity values. For wallaby and wilding pine control, previous research provided some quantitative estimates of biodiversity benefits which were incorporated.

In some instances, there are also non-quantified costs such as loss of carbon sequestration and potential soil erosion.

The key outcomes derived from the quantitative analysis of benefits and costs are shown in Table 31 below. Benefits exceed costs in most cases when the planned intervention is compared with doing nothing. Where the quantified figures give a negative net benefit, the 'dollar value per hectare' necessary for a net positive outcome to occur has been put

forward (see column E of Table 31). In Otago Regional Council's opinion, those per hectare values are likely to be met, if not exceeded, when the non-quantified benefits are considered. These instances are discussed further below.

9.2.1 Summary of cost benefit analysis

Table 31 provides an overview of the 'intensity level of analysis' undertaken (see Appendix B of the CBA Report), the alternative objectives considered, the plan objective proposed for each pest or groups of pests, the net benefit outcomes compared against a 'Do Nothing scenario', and the required non-quantified value (where applicable). The intensity level (Column B: 1 = low, 2 = medium and 3 = high in the) of the analysis is determined by:

- a. *the level of uncertainty of the impacts of the subject, or an organism being spread by the subject, or 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 the 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.*

The benefits and costs are shown and analysed in the table below.

Table 31: Types and analysis of costs and benefits

Analytical outcomes					
Pest	A Intensity Level of Analysis	B Objectives considered	C Proposed Objectives and reasons	D Risk Adjusted Net Benefit of Proposed Objective (NPV6% \$m)	E Biodiversity or other benefits needed for plan to be positive (\$/ha NPV)
Bennetts wallabies	2	Do nothing Eradication Sustained control (3 levels)	<u>Eradication</u> Provides the highest net return.	\$26 - \$97	
Rabbits (feral)	2	Do nothing Sustained control (2 levels)	Sustained Control.	\$158	
Rooks	1	Do nothing Eradication	<u>Eradication</u> The net return is positive.	\$0.36 - \$0.68	
African love grass	1	Do nothing Eradication Progressive containment Sustained control	<u>Progressive Containment</u> Provides the highest net return.	\$18.4	
Bomarea	1	Do nothing Eradication Progressive containment Sustained control	Progressive Containment Provides the highest net return.	\$27.9	

Boneseed	1	Do nothing Eradication Progressive containment Sustained control	<u>Progressive Containment</u> Net return is positive if biodiversity protection is taken into account.	-\$0.43	\$370/ha
Broom	2	Do nothing Eradication Progressive containment Sustained control	<u>Sustained Control</u> Provides the highest net return.	\$59.3	
Bur daisy	1	Do nothing Eradication Progressive containment Sustained control	<u>Progressive Containment</u> Provides the highest net return.	\$1.7	
Cape ivy	1	Do nothing Eradication Progressive containment Sustained control	<u>Progressive Containment</u> Provides the highest net return.	\$4.9	
Gorse	2	Do nothing Eradication Progressive containment Sustained control	<u>Sustained Control</u> Provides the highest net return.	\$59.3	
Lagarosiphon	1	Do nothing Eradication Progressive containment Sustained control	<u>Site led</u> While sustained control provides the highest net return, provided biodiversity values are taken into account, occupier agreement at each site means that the	-\$42.98 - -\$423.47	\$19000-82000/ha

			returns are assumed to be positive for the management proposed.		
Nassella tussock	2	Do nothing Eradication Progressive containment Sustained control	<u>Progressive Containment</u> While sustained control provides a higher net return, progressive containment can match it with very high levels of achievement.	\$112	
Nodding thistle	2	Do nothing Eradication Progressive containment Sustained control	<u>Sustained Control</u> Provides the highest net return.	\$1.6	
Old man's beard	1	Do nothing Eradication Progressive containment Sustained control	<u>Progressive Containment</u> Provides the highest net return.	\$10.2	
Perennial nettle	1	Do nothing Eradication Progressive containment Sustained control	<u>Progressive Containment</u> Provides the highest net return.	\$8.3	
Ragwort	2	Do nothing Eradication Progressive containment Sustained control	<u>Sustained Control</u> Provides the highest net return provided the assumptions are correct.	\$76.5	
Spartina	1	Do nothing Eradication	<u>Progressive Containment</u>	-\$5.6	\$8630

		Progressive containment Sustained control	Provides the highest net return if the assigned biodiversity value is held to be true.		
Spiny broom	1	Do nothing Eradication Progressive containment Sustained control	<u>Eradication</u> Provides the highest net return.	\$12.8	
White-edged nightshade	1	Do nothing Eradication Progressive containment Sustained control	Progressive Containment Provides the highest net return provided the assumptions are correct.	\$0.05	
Wild Russell lupin	1	Do nothing Sustained control	Sustained Control Provides positive net return if biodiversity values are held to be true.	Undefined	Must exceed \$160000 for the region plus control costs
Wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and/or larch	3	Do nothing Eradication Progressive containment Sustained control	Progressive containment (with a site-led approach). Preferred over sustained control due to long term benefits, non-monetised benefits and widespread community support, including landholder agreement in targeted sites.	\$226	
Site-led pests (excluding lagarosiphon)	1	Do nothing Site-Led	Site Led Likely to be positive assuming landholder agreement.	Likely to be positive	
Exclusion pests	1	Do nothing Exclusion	Exclusion Likely to be positive.	Likely to be positive	

Adapted from Table 1 Summary of cost benefit outcomes and funding recommendations - *Meeting the requirements of the Biosecurity Act 1993 and National Policy Direction for Pest Management 2015: Analysis of costs and benefits (2018)*.

9.2.2 Pests with a negative risk adjusted quantified net benefit

Boneseed, lagarosiphon, wild Russell lupin and spartina are in the Proposal because they pose significant threats to non-production values and pose little threat to production. Controlling these species will have biodiversity, recreation and amenity related benefits. The threshold value of \$370 per hectare for boneseed, \$19,000-\$82,000 per hectare for lagarosiphon and \$8,630 per hectare for spartina of land affected would need to be attributed to those other benefits in order for the plan to produce a positive outcome. Benefits from controlling wild Russell lupin are difficult to quantify because costs and benefits remain largely unknown. However, the costs associated with the proposed programme (\$160,000 NPV at 6%) is considered worthwhile given the likely biodiversity benefits arising from control. The Otago Regional Council considers this threshold to be a fair investment in protecting the non-production values attributable to the control of boneseed, lagarosiphon, wild Russell lupin and spartina.

9.2.3 Site-led programmes

Four site-led programmes support and build on the significant momentum and collaboration being achieved by a number of occupiers and wider community interest groups. The three site-led programmes in Dunedin are interrelated projects to reduce the impact of harmful organisms on indigenous biodiversity. Not-for-profit groups have worked on the Peninsula for more than 10 years to protect the indigenous flora and fauna that call the Peninsula home. In collaboration with local and central Government agencies, many residents are now part of coordinated efforts to manage predator pests and plant pests.

The Otago Peninsula site-led programme will support existing efforts to protect the important biodiversity values on the Peninsula. The West Harbour- Mt. Cargill site-led programme supports and builds on the significant momentum of the Orokonui Halo Project, a collaboration between the Landscape Connections Trust, OSPRI and Otago Natural History Trust. Quarantine Island / Kamau Taurua and Goat Island / Rakiki are located in the Otago Harbour. These islands provide stepping stones for bird species, but also for rat species and mustelids to move from one side of the harbour to the other by either swimming or on-board small boats/kayaks.

The site-led programme for lagarosiphon builds on the collaborative lagarosiphon management projects led by LINZ and supported by other key parties. They focus on control works in Lake Dunstan to keep important recreation areas clear, its extent is reduced in Lake Wanaka and the Kawarau River over time, and it is kept out of Lake Wakatipu. ORC will continue to support these programmes and advocate to LINZ for long-term suppression of lagarosiphon in Otago and, over time, eradication in key areas.

Expenditure at any single site will be limited and the programme will only be undertaken where feasible and in conjunction with the land occupier. With such agreement from the land occupier it signals that for them the benefits of the programme are likely to exceed the costs they will incur. Likewise, the ORC considers that the benefits to the ORC and the wider community of the site-led programme exceed the costs and the requirements of Section 6 of the NPD will have been met.

9.2.4 Good neighbour rules

In addition to considering the benefits and costs of controlling a pest under a pest management programme, Section 8 of the NPD must also be considered where a good neighbour rule (GNR) is proposed for a pest. This Section requires that the:

- Pest would spread onto adjacent land;
- That the pest would cause unreasonable costs for the adjacent occupier;
- The adjacent occupier is controlling the pest;
- The requirement on the occupier from whence the pest (source) is spreading is not more than is required to prevent the pest spreading; and
- The costs of compliance for the source occupier are reasonable, relative to the cost that the adjacent occupier holder would incur from the pest spreading.

The reasonability test holds for GNR's in most situations. However, exemptions may need to be considered in some situations. Namely:

- For rabbits where the adjacent land exhibits low proneness to rabbit infestation;
- For broom, gorse and wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and larch where the infestation on the source land is heavy; and
- For ragwort where the land use on the adjacent land does not involve cattle.

What constitutes 'reasonable measures'?

The NPD requires a GNR to consider whether the owner or occupier of nearby or adjacent land is taking 'reasonable measures' to manage a pest or its impacts.

If the occupier of nearby or adjacent land is not taking 'reasonable measures' to protect from the pests or its impacts, this is taken as an indication the pest is unlikely to be affecting their use of the land, and the threat of pests from a nearby or adjacent property is unlikely to be causing them 'unreasonable costs'.

What measures are 'reasonable' will differ depending on the nature and threat of the pest, and the uses and values of the land.

The NPD outlines some general principles for defining what 'reasonable measures' are. In some cases, the 'reasonable measures' may be the measures sufficient to comply with obligations in another rule in the regional pest management plan.

In other cases, the measures considered reasonable will depend on whether land is currently present on the property.

If the pest is not currently present on the neighbour's land, the measures might include regular monitoring adequate for detecting the pest, and the intent and ability to control the pest if detected.

If the pest is present, the occupier should be managing it or its impacts. What is reasonable will depend on the uses and values of the land.

9.3 CONSIDERATION OF EFFECTS

Otago Regional Council considers that implementing the Plan will deliver positive outcomes for the community. The effects of implementing the Plan (in relation to each pest) for the relationship between the culture, traditions, ancestral lands, waters, sites, wāhi tapu and taonga of Kāi Tahu, environment, human health, the enjoyment of the natural environment, economic well-being and the marketing overseas of New Zealand products are described in this section of the Proposal.

9.3.1 Effects on Māori

The Plan is expected to have overall beneficial effects for Māori culture and traditions. Specifically, this Plan will prevent or reduce plant pest infestations, invasion and consequential degradation of wāhi tapu and taonga sites. Destruction of indigenous flora by animal pests will be prevented or reduced.

In the development of this proposal Kāi Tahu have not identified any specific matters for the Plan to address. However, additional input from Kāi Tahu may be provided by submissions to the Plan.

9.3.2 Effects on the environment

The successful implementation of this Proposal will result in enhanced conservation, production, recreation and aesthetic values in the region by avoiding or minimising the adverse effects that animal and plant pests may have on the environment.

The beneficial effects include mitigating the adverse effects that high levels of rabbits have on native grassland ecosystems and on the soil resource. Preventing the establishment of wallabies is also beneficial given the adverse effects they have on native forests. Likewise, eradicating rooks is beneficial to the production environment.

Detrimental effects are principally associated with the use of herbicides and pesticides where these adversely affect non-target species. With respect to animal pesticides such as 1080 poison, pindone and cyanide, the effect on non-target species such as birds and invertebrates is strongly linked to the choice of bait (for example oats, carrot, pellets, jam), bait quality in the case of carrots, and the timing and location of operations. However, the introduction of rabbit haemorrhagic disease RHD in 1997 has resulted in minimising the use of 1080 and other pesticides for rabbit control.

In some cases, impacts on non-target species will be unavoidable but ORC will use best practice to minimise these effects, for example, by using sound operational procedures, skilled pest operators and requiring adherence to technical standards. On balance, ORC considers the detrimental effects on non-target species from control tactics to be less significant than the benefits to the environment from controlling pests in this Proposal.

Of the technical methods proposed to control animal and plant pests and other organisms to be controlled, the safe and efficient use of toxins and chemicals is of particular interest to the public. Addressing the concerns will occur through implementing the provisions of:

- (a) the Health and Safety at Work Act 2015;
- (b) the Resource Management Act 1991;
- (c) operational plans;
- (d) procedures, manuals and guidelines; and

(e) the Agricultural Compounds and Veterinary Medicines Act 1997.

Mitigating the adverse effects from plant pests can also benefit native ecosystems as well as production and pastoral environments. In some cases, imprudent removal of gorse and broom could prevent the vegetation succession process from occurring or increase erosion risk on steep land.

The specific effects being avoided or mitigated, on a pest-by-pest basis, are identified in Section 6.

9.3.3 Effects on human health

Some control methods, such as the use of chemicals and toxins, have the potential to adversely affect human health. The methods described above for minimising the risk to the environment also apply to minimising potential effects on human health. Concerns to human health are also addressed by the Hazardous Substances and New Organisms Act 1996. No other significant adverse effects on human health are anticipated.

9.3.4 Effects on enjoyment of the environment

Enjoyment of the environment may be impacted directly and indirectly by the Proposal. The Proposal benefits biodiversity which is appreciated and enjoyed by many people. Some pests, such as wilding conifers, can have very significant visual impacts affecting people's appreciation of the environment.

Control may also affect enjoyment of the environment by negatively impacting on recreational opportunities. Examples include reduced hunting opportunities for rabbits or inhibiting the use of some plants in gardens or areas where they may provide visual or aesthetic amenity.

9.3.5 Effects on economic well-being

The proposal will have a significant impact on economic well-being. The adverse effects on production are described elsewhere in this Proposal and in many instances are the primary reason for intervention. For each pest, the overall benefits (including both production and biodiversity) have been assessed as greater than the costs of control. The CBA Report has assessed that the combined management of all pests in the Proposal would amount to an overall net benefit of \$868.8 Million⁶ over the next one hundred years. Full details of the production benefits and costs of control are provided in the CBA Report.

9.3.6 Effects on the marketing overseas of New Zealand products

The control of animal and plant pests will increase agricultural production in some cases. Consequently, this Proposal is expected to have some beneficial effects for the marketing overseas of New Zealand products. The control of plant pests could also further enhance New Zealand's reputation as a "clean green" nation.

In the future, however, there could be increasing concerns from international markets and consumers regarding the use of chemical and biological control. These concerns would largely involve residues and product purity.

⁶ Based on net present value with a discount rate of 6 percent.

9.4 BENEFICIARIES AND EXACERBATORS

The extent to which any person benefits or is likely to benefit from a pest management plan depends on the organism to be controlled and the area for which expenditure is being incurred. Beneficiaries include occupiers and the community as a whole. Occupiers may benefit from increased productivity as a result of the effects of the Plan on their own property and from reduced risk of spill-over effects from other properties. The community as a whole may obtain non-producer benefits from the implementation of the Plan.

Non-producer benefits include a reduction in the actual and potential effects of pests on one or more of the following:

- (a) the viability of rare or endangered species or organisms;
- (b) the survival and distribution of indigenous plants or animals;
- (c) the sustainability of natural and developed ecosystems, ecological processes and biological diversity;
- (d) soil resources or water quality;
- (e) human health or enjoyment of the recreational value of the natural environment;
- (f) the relationship of Māori and their culture and traditions with their ancestral lands, waters, sites, wāhi tapu, and taonga;
- (g) New Zealand's international obligations, assurances and reputation; and
- (h) other aspects of the environment including amenity and landscape values.

Spill-over (externality) effects result in costs or benefits to people other than the land occupier on whose property the pests are located. They include the effects of the spread of plant or animal pests onto neighbouring properties and environmental effects that have costs or benefits to the community as a whole. For example, the spread of rabbits or seeds of plants onto neighbouring properties or damage to indigenous biodiversity are spill-over effects. The reduced risk of spill-over occurs because the Plan brings about the control of pests, thereby reducing the risk to neighbouring properties and the risk of non-producer values being affected.

The non-spill-over benefit (producer benefit) that producers receive by way of extra production and lower control costs, when they control pests on their property, occurs regardless of whether a plan is in place.

The extent to which persons contribute to the problems to be resolved by the Plan for each depends on whether their inaction has the potential to result in spill-over effects that cause significant harm to other persons or to the environment generally.

Table 32 below shows two groups of people: those who have been identified as benefiting from controlling pests (beneficiaries); and those who contribute to the pest problem (exacerbators). A full evaluation can be found in the CBA Report⁷

Table 32: Beneficiaries and exacerbators

Pest	Beneficiaries	Exacerbators
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⁷ Meeting the requirements of the Biosecurity Act 1993 and National Policy Direction for Pest Management 2015: Analysis of costs and benefits (2018).

Bennett's wallaby, rabbit.	Rural occupiers, who will benefit from economic values being protected. Neighbouring property occupiers, who will benefit from the prevention of spill-over. Regional community, who will benefit through environmental values being protected.	Occupiers who do not undertake control on their properties. Persons who knowingly distribute wallabies or rabbits to new areas.
Rook.	Rural occupiers, who will benefit from economic values being protected.	Occupiers where rooks occur on their properties. Persons who knowingly distribute rooks.
Bur daisy, nassella tussock, nodding thistle, perennial nettle.	Rural occupiers, who will benefit from economic values being protected. Neighbouring property occupiers, who will benefit from the prevention of spill-over.	Occupiers who do not undertake control on their properties. Persons who knowingly distribute any of these plant pests to new areas.
African love grass, broom, gorse, spiny broom, white-edged nightshade.	Rural occupiers, who will benefit from economic values being protected. Neighbouring property occupiers, who will benefit from the prevention of spill-over. Regional community, who will benefit through environmental values being protected.	Occupiers who do not undertake control on their properties. Persons who knowingly distribute any of these plant pests to new areas.
Wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and larch.	Rural occupiers, who will benefit from economic values being protected. Neighbouring property occupiers, who will benefit from the prevention of spill-over. Regional community, who will benefit through biodiversity, landscape and recreational values being protected.	Occupiers who do not undertake wilding conifer, contorta, Corsican, Scots, mountain and dwarf mountain pines and larch control on their properties. Persons who knowingly distribute wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and larch to new areas. Occupiers with conifer plantations, shelterbelts or amenity plantings allowing seeds to spill-over from their properties.
Bomarea, boneseed, cape ivy, old man's beard, spartina and wild Russell lupin.	Regional community, who will benefit through environmental values being protected.	Occupiers who do not undertake control on their properties. People who knowingly distribute any of these plant pests to new areas.

African feather grass, Chilean needle grass, false tamerisk and moth plant.	Regional community, who will benefit through environmental values being protected.	Persons who knowingly bring any of these plant pests into the Otago region.
	Rural occupiers, who will benefit from economic values being protected.	Persons who fail to notify Otago Regional Council of any new infestations.
Banana passionfruit, Chilean flame creeper, Darwin's barberry, feral cat, feral deer, feral goat, feral pig, hedgehog, lagarosiphon, mustelids, possum, rat, sycamore, gunnera and tradescantia (all managed under site-led programmes).	Regional community, who will benefit through environmental values being protected at and adjacent to high value sites.	Occupiers who do not undertake control at or adjacent to high value sites on their properties.
	Rural occupiers, who will benefit from economic values being protected at or adjacent to high value sites.	People who knowingly distribute any of these pests to new areas.

9.5 FUNDING SOURCES AND REASONS FOR FUNDING

The Biosecurity Act 1993 and the Local Government (Rating) Act 2002 require that funding is sought from:

- people who have an interest in the Plan;
- those who benefit from the Plan; and
- those who contribute to the pest problem.

Funding must be sought in a way that reflects economic efficiency and equity. Those seeking funds should also target those funding the Plan and the costs of collecting funding.

In general, efficiency is best achieved by targeting costs to those closest to a particular work where those paying can act in respect of those works. If the person deciding has to pay for the results of their action or inaction, they may change their behaviour to minimise costs. Doing so would lead to the least-cost outcome for society. But if another person pays those costs, the incentive to change behaviour is minimal. This may lead to a higher cost for society. Efficiency includes close targeting of costs to beneficiaries and to those contributing to the problem (exacerbators). Equity is more difficult to establish, particularly if a "public good" component exists. In general, there are no relevant guidelines available.

Practicality will determine the extent to which different beneficiaries can be targeted. There is generally a point at which the transaction and administrative costs of recovering costs from a smaller group of beneficiaries will exceed the benefits of more closely targeting that group. Alternatively, the mechanisms available may not be able to target a particular group, for example, individual land uses such as dairying. Therefore, a larger aggregate such as all rural land must be used.

The aim of the funding system should be to maximise the efficiency of resource decision-making by participants. There are two ways in which this happens. They are:

- Charging beneficiaries ensures that the decisions on whether an activity is worthwhile are closely related to the benefits received. If the beneficiaries are charged for the activity, but do not perceive the level of benefit that has been ascribed to them, they will act to reduce the charge and therefore the level of the activity. Similarly, where

stakeholders demand more of an activity where they are required to pay, Otago Regional Council can be assured that the level of benefit from the activity exceeds the costs, and that the activity is being undertaken at an appropriate level.

- Charging exacerbators ensures that where a management action causes problems for other parties, the costs of those problems are fully integrated into the decision on whether the management activity is worthwhile. For pest management, the land-use decisions by land occupiers affects the level and type of pest problem. By charging those occupiers directly for these effects in a way that encourages them to take account of pest problems in their management, the most efficient resource allocation decisions are made. Ideally this leads to land occupiers seeking the most efficient means of achieving pest management objectives.

A key feature of exacerbator payments, however, is that it only achieves greater efficiency where the incentive exists for land managers to take account of the pest management objective in their decisions. Rating does not achieve this because the land manager experiences the cost regardless of whether they change their management decisions to take account of the objectives. Direct charges in the form of control costs, which reflect the level of contribution to the problem, are therefore preferred.

The funding rationale incorporates the principle that those who fund the Plan should not pay for those measures outlined in Section 5.3 for which they receive no benefit or for which another party would normally consider is its role to fund. For instance, it is inequitable to fund the environmental education component of the Plan from a rate on rural land. The rationale, therefore, adopts an activity-based approach where funding shares are identified by Plan activity. An activity-based approach allows the incremental benefit from specific activities, as opposed to pest management generally, to be assessed.

For cost allocation purposes, Otago Regional Council commissioned a review of the levels of benefit accruing to rural and regional rate paying beneficiaries and exacerbators from the activities undertaken to achieve the objectives in this Proposal. The results form part of the analysis of costs and benefits and are contained in the CBA Report, which also contains guidance on Inspection and Control. The funding formulae for service delivery (e.g. biological control), advocacy and advice (information and publicity), and monitoring, remain largely in accord with those contained in the 2009 Strategy.

There are additional new pests in the proposed Plan compared to the existing Strategy, such as those in the exclusion programme and eradication programmes' pests (for example, Chilean needle grass, moth plant), wild Russell lupin and wilding conifers. There is also a much broader range of species that are targeted for site-led programmes. Adjustments to funding formulae are made accordingly.

The funding formulae for this is set out in the following table.

Table 33: Funding formula under the Proposed Plan

Funding formulae	
Rural land owners and/or occupiers %	Regional Community %
African feather grass, Chilean needle grass, false tamarisk, moth plant, spiny broom, spartina	

Inspection and monitoring		100
Education and advocacy		100
Control		100
Bennett's wallaby		
Inspection and monitoring	40	60
Education and advocacy		100
Control	40	60
Rook		
Inspection and monitoring		100
Education and advocacy		100
Control	100	
Bur daisy, gorse, nassella tussock, nodding thistle, perennial nettle, rabbit, ragwort		
Inspection and monitoring	100	
Education and advocacy		100
Control	100	
African love grass, broom, wild Russell lupin		
Inspection and monitoring		
Production	100	
Biodiversity	50	50
Education and advocacy		100
Control		
Production	100	
Biodiversity	50	50
Bomarea, boneseed, cape ivy, old man's beard, wilding conifers, contorta, Corsican, Scots, mountain and dwarf mountain pines and larch		
Inspection and monitoring		100
Education and advocacy		100
Control	100 (prevent spread)	100 (initial control)
White-edged nightshade		
Inspection and monitoring	50	50
Education and advocacy		100
Control		100
Site-led programme pests		
Inspection and monitoring		100

Education and advocacy		100
Control	By agreement	
Other activities		
Enforcement	User payers wherever possible	General rate when it is not possible

The overall level of inspection, monitoring, advice and advocacy is determined by Otago Regional Council independently of the pest problem on any particular property. On the other hand, control will vary with both the pest problem and the occupier's response to it on a particular property. It is important that occupiers bear the full consequences of their actions. This is likely to promote the best or optimal response from the point of view of the community as a whole.

The funding of costs allocated to rural occupiers will be through targeted rates applied to occupiers of rateable rural land. The rating base is land value, which reflects the potential effects of pests on land assets. Land area is an alternative rating base but it is less equitable for larger properties in the region because much of the land is not affected by spill-over of pests from neighbouring properties.

Otago Regional Council will continue to negotiate with Crown agencies to secure agreements to assist with the costs of implementing the Plan.

9.6 ANTICIPATED COSTS OF IMPLEMENTING THE PLAN

The anticipated costs of implementing the proposed Plan reflect a best estimate of expenditure levels. Funding levels will be further examined and set during subsequent Long Term Plan and Annual Plan processes. While community funding is mainly sourced from rates, alternative funding sources will be sought by the Otago Regional Council. Such funds will off-set rates or be used as a value-added component in appropriate circumstances.

The funding of the implementation of the proposed Plan is from a region-wide general rate (or targeted rate as applicable), set and assessed under the Local Government (Rating) Act 2002, and in determining this, the Otago Regional Council has had regard to those matters outlined in section 100T of the Biosecurity Act.

It is anticipated that the estimated annual cost to the ORC for implementing the Plan will be **\$1,857,000**.

Where the implementation of this Plan is to be funded by a targeted rate, the matters outlined in section 100T of the Biosecurity Act will be given specific regard to as part of the Annual Plan or Long Term Plan process.

9.7 FUNDING LIMITATIONS

There are no unusual administrative problems or costs expected in relation to recovering costs from any of the persons who are required to pay. It is recognised that there may be a need to recover enforcement costs for some exacerbators through the courts. In some cases, for example where not all exacerbators can be identified, full cost recovery will not be realised and a rating contribution will be required.

Glossary

Act	means the Biosecurity Act 1993, including any accompanying amendments and regulations.
Adjacent	means, for the purpose of this Plan, a property that is next to, or adjoining, another property.
Artificial watercourse	means a watercourse that is created by human action. It includes an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal channel. It does not include artificial swales, kerb and channelling or other watercourses designed to convey stormwater.
Authorised Person	has the same meaning as in the Biosecurity Act 1993: " <i>a person for the time being appointed an authorised person under section 103 of this Act.</i> "
Bed	means: <ul style="list-style-type: none">a. in relation to any river, the space of land which the waters of the river cover at its fullest flow without overtopping its banks;b. in relation to any lake, except a lake controlled by artificial means, the space of land which the waters of the lake cover at its highest level without exceeding its margin;c. in relation to any lake controlled by artificial means, the space of land which the waters of the lake cover at its maximum permitted operating level; andd. in relation to the sea, the submarine areas covered by the internal waters and the territorial sea.
Benefits	includes benefits of any kind, whether monetary or non-monetary.
Beneficiaries	means the receivers of benefits accruing from the implementation of a pest management measure or plan.
Biodiversity	means the variability among living organisms from all sources including, among other things, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part. This includes diversity within species, between species, and of ecosystems.

Biological Control	means the introduction and establishment of natural enemies that will prey on or adversely affect a pest or other organisms to be controlled.
Braided river	means any river with multiple, successively divergent and rejoining channels separated by gravel islands.
Capital Value	has the same meaning as in the Rating Valuations Act 1998: <i>“capital value of land means, subject to sections 20 and 21, the sum that the owner's estate or interest in the land, if unencumbered by any mortgage or other charge, might be expected to realise at the time of valuation if offered for sale on such reasonable terms and conditions as a bona fide seller might be expected to require.”</i>
Consultation	the communication of a genuine invitation to give advice and a genuine consideration of that advice.
Containment area	an area of pest infestation managed differently from the rest of Otago.
the Council	Otago Regional Council
Crown	means the New Zealand Government.
Costs	includes costs of any kind, whether monetary or non-monetary.
Destroy	means pull, breakdown, demolish, make useless, kill, cause to cease to exist.
Direction	in relation to Part 6 powers under the Act means a notice issued in accordance with section 122 of the Biosecurity Act 1993 requesting a person or land occupier to carry out certain work or measures.
Distribute	means to transport or in any way spread a pest.
Ecosystem	means a dynamic complex of plant, animal and micro-organism communities and their non-living environment, interacting as a functioning unit.
Effect	has the same meaning as in the Biosecurity Act 1993, unless the context otherwise requires, and: <ul style="list-style-type: none"> a. includes the following, regardless of scale, intensity, duration, or frequency: <ul style="list-style-type: none"> i. a positive or adverse effect; and ii. a temporary or permanent effect; and iii. a past, present, or future effect; and iv. a cumulative effect that arises over time or in combination with other effects; and b. also includes the following: <ul style="list-style-type: none"> i. a potential effect of high probability; and ii. a potential effect of low probability that has a high potential impact
Environment	has the same meaning as in the Biosecurity Act 1993: <i>“includes—</i> <ul style="list-style-type: none"> a. <i>Ecosystems and their constituent parts, including people and their communities; and</i>

	<p>b. All natural and physical resources; and</p> <p>c. Amenity values; and</p> <p>d. The aesthetic, cultural, economic, and social conditions that affect or are affected by any matter referred to in paragraphs (a) to (c) of this definition.”</p>
Environmental values	means the environment, human health, enjoyment of the natural environment, and the relationship between Māori, their culture, and their traditions and their ancestral lands, waters, sites, wāhi tapu, and taonga.
Exacerbator	means the person aggravating or contributing to a particular pest management problem by action or inaction.
Feral	means wild or otherwise unmanaged.
Forest plantation	means a forest deliberately established for commercial purposes, being at least 1ha of continuous forest cover of forest species that has been planted and has or will be harvested or replanted.
Goods	is defined under the Act as any personal property.
Good Neighbour Rule	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>"means a rule to which the following apply:</i></p> <p>a. <i>it applies to an occupier of land and to a pest or pest agent that is present on the land; and</i></p> <p>b. <i>it seeks to manage the spread of a pest that would cause costs to occupiers of land that is adjacent or nearby; and</i></p> <p>c. <i>it is identified in a regional pest management plan as a good neighbour rule; and</i></p> <p>d. <i>it complies with the directions in the national policy direction relating to the setting of good neighbour rules."</i></p>
Habitat	means the place or type of site where an organism or population normally occurs.
Harmful organisms	means organisms that have not been declared ‘pests’ for the purposes of this Plan because, although they may have significant adverse effects, regulatory responses are not considered appropriate or necessary.
Indigenous	a native of New Zealand.
Kāi Tahu	descendants of Tahu, the tribe, tangata whenua of Otago.
Lag phase	the period of relative inactivity between the introduction of a species, and the commencement of that species’ exponential spread.
Mahika Kai	places where food is produced or procured.
Landowner	<p>has the same meaning as occupier in the Biosecurity Act 1993:</p> <p><i>“occupier,—</i></p> <p>a. <i>In relation to any place physically occupied by any person, means that person; and</i></p> <p>b. <i>In relation to any other place, means the owner of the place; and</i></p>

	<p>c. <i>In relation to any place, includes any agent, employee, or other person, acting or apparently acting in the general management or control of the place.</i>"</p>
Management Agency	<p>management agency means the Otago Regional Council, the agency given the task of implementing the Strategy</p> <p>or</p> <p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>"the Department, authority, or body corporate specified in a pest management strategy as the agency given the task of implementing the strategy."</i></p> <p>For the purposes of this document, Otago Regional Council is the management agency for pests and other organisms to be controlled in the Otago Region.</p>
Manawhenua	<p>Those with rangatiratanga (chieftainship or authority) for a particular area of land or district.</p>
Modified McLean Scale	<p>This scale assesses rabbit population levels.</p>
Monitoring	<p>in relation to a pest or other organisms to be controlled means to observe and measure the occurrence or non-occurrence of a pest or other organisms to be controlled.</p>
National Policy Direction	<p>in respect of this Plan, means the currently operative National Policy Direction for Pest Management.</p>
Net Present Value (NPV)	<p>means the difference between the total benefits in present day terms and the total costs in present day terms at a specified discount rate.</p>
Non braided river	<p>means a continually or intermittently flowing body of fresh water that is not a braided river; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity generation, and farm drainage canal).</p>
Occupier	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>"a. In relation to any place physically occupied by any person, means that person; and</i></p> <p><i>b. In relation to any other place, means the owner of the place; and</i></p> <p><i>c. In relation to any place, includes any agent, employee, or other person, acting or apparently acting in the general management or control of the place."</i></p>
Operational Plan	<p>means a plan prepared by the Management Agency under Section 100B of the Act.</p>
Organism	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>"a. Does not include a human being or a genetic structure derived from a human being;</i></p> <p><i>b. Includes a micro-organism;</i></p> <p><i>c. Subject to paragraph (a) of this definition, includes a genetic structure that is capable of replicating itself (whether that structure comprises all or only part of an entity, and whether it</i></p>

	<p><i>comprises all or only part of the total genetic structure of an entity):</i></p> <p>d. <i>Includes an entity (other than a human being) declared by the Governor-General by Order in Council to be an organism for the purposes of this Act:</i></p> <p>e. <i>Includes a reproductive cell or developmental stage of an organism:</i></p> <p>f. <i>Includes any particle that is a prion.”</i></p>
Person	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>“includes the Crown, a corporation sole, and a body of persons (whether corporate or unincorporate).”</i></p>
Pest	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>“an organism specified as a pest in a pest management plan.”</i></p>
Pest agent	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>“in relation to any pest, means any organism capable of—</i></p> <p>a. <i>helping the pest replicate, spread, or survive; or</i></p> <p>b. <i>interfering with the management of the pest”</i></p>
Pest Management Plan	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>“a plan, made under Part 5 of this Act, for the management or eradication of a particular pest or pests.”</i></p>
Plant	<p>means any plant, tree, shrub, herb, flower, nursery stock, culture, vegetable, or other vegetation; and also includes fruit, seed, spore and portion or product of any plant; and also includes all aquatic plants.</p>
Principal Officer	<p>The principal administrative officer of a regional council; and</p> <p>a. In relation to a regional council, means the principal officer of that council; and</p> <p>b. In relation to a region, means the principal officer of the region's regional council; and includes an acting principal officer; and</p> <p>c. In relation to the Otago Regional Council, means the Chief Executive Officer; and includes an acting Chief Executive Officer.</p>
Propagation	<p>means to multiply or reproduce by sowing, grafting, breeding or any other way.</p>
River	<p>means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity generation, and farm drainage canal).</p>
Rule	<p>means a rule included in a pest management plan in accordance with section 73(5) of the Biosecurity Act 1993.</p>
Rural Zoned Land	<p>means land zoned for rural use under any territorial district plan applicable within the Otago Region. This includes rural residential and lifestyle zones but excludes large lot residential.</p>
Sale	<p>includes bartering; offering for sale; exposing, or attempting to sell; or having in possession for sale; or sending or delivery for sale;</p>

	causing or allowing to be sold, offered, or exposed for sale; and also includes any disposal whether for valuable consideration or not. "Sell" has a corresponding meaning.
Unwanted organism	<p>has the same meaning as in the Biosecurity Act 1993:</p> <p><i>"means any organism that a chief technical officer believes is capable or potentially capable of causing unwanted harm to any natural and physical resources or human health; and</i></p> <p><i>a. includes—</i></p> <ul style="list-style-type: none"> <i>i. any new organism, if the Authority has declined approval to import that organism; and</i> <i>ii. any organism specified in <u>Schedule 2</u> of the Hazardous Substances and New Organisms Act 1996; but</i> <p><i>b. does not include any organism approved for importation under the <u>Hazardous Substances and New Organisms Act 1996</u>, unless—</i></p> <ul style="list-style-type: none"> <i>i. the organism is an organism which has escaped from a containment facility; or</i> <i>ii. a chief technical officer, after consulting the Authority and taking into account any comments made by the Authority concerning the organism, believes that the organism is capable or potentially capable of causing unwanted harm to any natural and physical resources or human health"</i>
Water body	means fresh water in a river, lake, stream, pond, wetland, or aquifer, or any part thereof, that is not located within the coastal marine area.
Wilding conifer	Wilding conifers are any introduced conifer tree, including (but not limited to) any of the species listed in Table 3, established by natural means, unless it is located within a forest plantation, and does not create any greater risk of wilding conifer spread to adjacent or nearby land than the forest plantation that it is a part of. For the purposes of this definition, a forest plantation is an area of 1 hectare or more of predominantly planted trees. This also excludes existing planted conifers of less than 1ha, such as windbreaks and shelterbelts at March 2019.
Wild Russell lupin	Wild Russell lupins are Russell lupins that are established by natural means.

Appendices

APPENDIX 1 ORGANISMS OF INTEREST

Common name	Scientific name
Plants	
Blackberry	<i>Rubus fruticosus</i>
Boxthorn	<i>Lycium ferocissimum</i>
Briar	<i>Rosa rubiginosa</i>
Buddleia	<i>Buddleja davidii</i>
Burdock	<i>Arctium minus</i>
Convolvulus	<i>Convolvulus arvensis</i>
Cotoneaster	<i>Cotoneaster</i> spp.
Cotton thistle	<i>Onopordum acanthium</i>
Egeria	<i>Egeria densa</i>
Giant hogweed	<i>Heracleum mantegazzianum</i>
Hieracium (hawkweed)	<i>Hieracium</i> spp.
Horehound	<i>Marrubium vulgare</i>
Hawthorne	<i>Crataegus monogyna</i>
Japanese honeysuckle	<i>Lonerica japonica</i>
Lake snow	<i>Lindavia intermedia</i>
Periwinkle	<i>Vinca major</i>
Reed sweetgrass	<i>Glyceria maxima</i>
Rowan	<i>Sorbus aucuparia</i>
Saltmarsh rush	<i>Juncus geraldii</i>

Thyme	<i>Thymus vulgaris</i>
Wild ginger	<i>Hedychium gardnerianum</i>
Wild Thyme	<i>Thymus serpyllum</i>
Willow	<i>Salix</i> spp.

Animals

Goose Canada White/domestic	<i>Branta canadensis</i> <i>Anser</i> spp.
Wasp	<i>Vespula</i> spp.
Mouse	<i>Mus musculus</i>

Marine

Asian paddle crab	<i>Charybdis japonica</i>
Mediterranean fanworm	<i>Sabella spallanzanii</i>
Sea couch	<i>Agropyron pungens</i>
Sea squirts	<i>Styela clava</i> , <i>Eudistoma elongatum</i> , <i>Pyura doppelgangera</i> and <i>Didemnum vexillum</i>
Undaria	<i>Undaria pinnatifida</i>

APPENDIX 2 MODIFIED MCLEAN SCALE

This scale assesses rabbit population levels.

1. No sign found. No rabbits seen.
2. Very infrequent sign present. Unlikely to see rabbits.
3. Odd rabbits seen; sign and some buck heaps showing up. Pellet heaps spaced 10 metres or more apart on average.
4. Pockets of rabbits; sign and fresh burrows very noticeable. Pellet heaps spaced between 5 metres and 10 metres apart on average.
5. Infestation spreading out from heavy pockets. Pellet heaps spaced 5 metres or less apart on average.
6. Sign very frequent with pellet heaps often less than 5 metres apart over the whole area. Rabbits may be seen over the whole area.
7. Sign very frequent with 2-3 pellet heaps often less than 5 metres apart over the whole area. Rabbits may be seen in large numbers over the whole area.
8. Sign very frequent with 3 or more pellet heaps often less than 5 metres apart over the whole area. Rabbits likely to be seen in large numbers over the whole area.

APPENDIX 3 MAPS



TO PROTECT WHAT WE TREASURE:

BIOSECURITY STRATEGY

Proposed Biosecurity Strategy for public feedback
1 November 2018

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OTAGO REGIONAL COUNCIL BIOSECURITY STRATEGY



Proactive Biosecurity Management	Responsive and Flexible	Integrated and Collaborative Action	Landscape Scale and Site Scale
Addressing issues before they become significant	Utilise the most efficient and effective methods for control	Working with all parties at all levels	Target key areas for collaborative and coordinated control
Action 3.1.1 Managing pathways	Action 3.2.1 Administer the Pest Management Plan	Action 3.3.1 National and sub-national initiatives with MPI and others	Action 3.4.1 Provide regional leadership and support for site-led programs
Action 3.1.2 Excluding harmful organisms from Otago	Action 3.2.2 Be flexible in responding to other biosecurity issues	Action 3.3.2 Cooperation and partnerships with local authorities	Action 3.4.2 Advocate and support the continued suppression of lagarosiphon
Action 3.1.3 Eradicating pests from Otago	Action 3.2.3 An 'all of council' approach to biosecurity at Otago Regional Council	Action 3.3.3 Support and work in partnership with Kai Tahu	Action 3.4.3 Other site and landscape scale initiatives
Action 3.1.4 Investing in research and development	Action 3.2.4 Regularly report on biosecurity issues and successes	Action 3.3.4 Support and empower Otago's people and communities	
<ul style="list-style-type: none"> • Biosecurity technical working group • A marine pathway management plan • Landowner led possum control programme • Exclusion pest surveillance programme 	<ul style="list-style-type: none"> • Update Otago Regional Council operating procedures • Guidance on harmful organisms • Transitional programmes in Pest Management Plan • Urban gorse and broom programme • Landowner led rabbit programme 	<ul style="list-style-type: none"> • Support Enviroschools in biosecurity • Promote the eco fund • Volunteer facilitation programme • Shared data platform • National or multi-regional pest management responses 	<ul style="list-style-type: none"> • Contributes to Predator Free Dunedin management plan and develop an Otago Regional Council plan of action • Support Dunedin City Council urban linkages plan • Support groups with site led initiatives

PART ONE: INTRODUCTION



Old Man's Beard

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This strategy sets out the Otago Regional Council’s (ORC) biosecurity approach and prioritises a programme of action for effective biosecurity management across Otago.

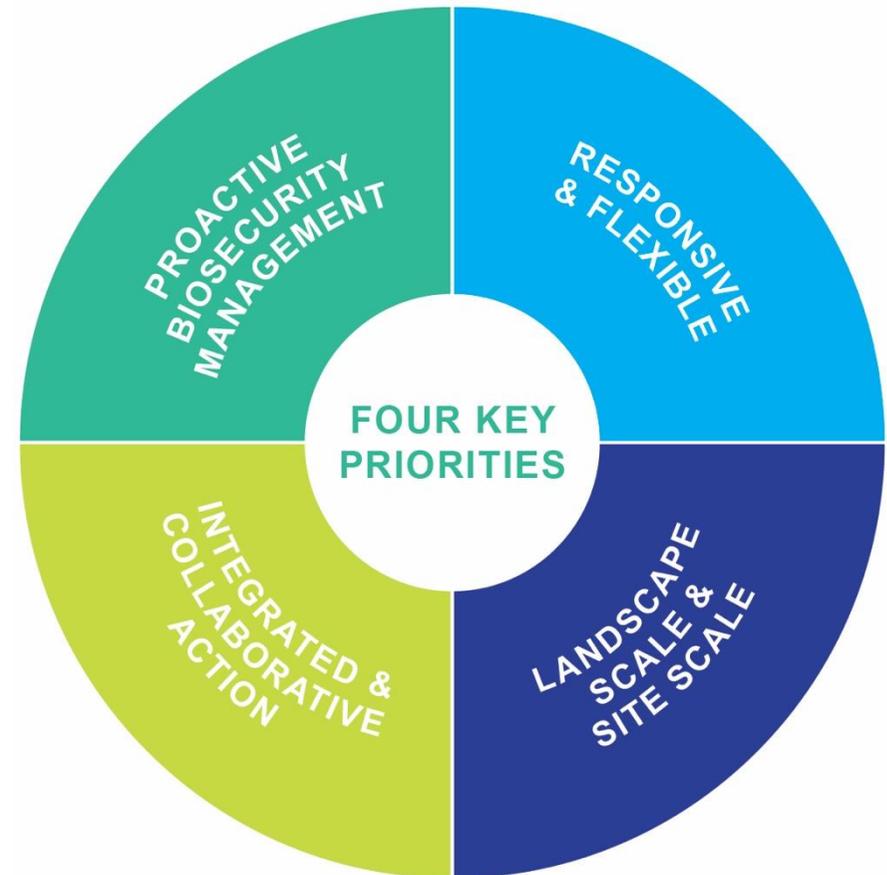
This strategy integrates ORC’s statutory and non-statutory biosecurity functions, including the proposed Regional Pest Management Plan (Pest Management Plan) and all other biosecurity activities such as monitoring and surveillance, research, incursion responses and collaborative action.

The strategy will guide the delivery of ORC’s biosecurity activities over the next 10 years. This includes different measures to protect our environment, economy and communities from the impact of harmful organisms

1.2 WHAT WE WANT TO ACHIEVE

To protect what we treasure from the impacts of harmful organisms

This is an ongoing, long-term goal for biosecurity in Otago. We have set four key priorities that shape how ORC will deliver biosecurity functions over the next 10 years. Each priority has a series of actions that inform how ORC will undertake biosecurity management. An implementation programme then sets out key projects and activities for the first five years of this strategy and requires an annual operation plan be prepared to measure progress.



1.3 INTRODUCED SPECIES IN OUR REGION

Otago covers 12% of New Zealand's land area and at about 32,000km², is the second largest region in New Zealand. We have a high level of endemism, a wide range of geography and ecosystems, from alpine regions, glacial lakes, grasslands, forests, and a dramatic coastline.

Agriculture is the basis of Otago's economic development and continues to be a major source of revenue, as does mining and education. Tourism is also a key contributor to the Otago economy and a significant employer in the region. Otago's landscapes and geography are a key attraction to those who visit the region.

Many of New Zealand's introduced species are now harmful organisms in Otago. Some of these were introduced for trades and industries, some by acclimatisation efforts, and others accidentally. Some have only recently arrived. Given our region's reliance on our agricultural and tourism sectors, and our abundant biodiversity, harmful organisms have a major impact on our region.

1.4 WHAT THE BIOSECURITY STRATEGY COVERS

Harmful organisms

A harmful organism is a plant, animal or other organism that is capable of causing harm to our environment, communities or economy. Not all harmful organisms can or should be managed in Otago's Pest Management Plan, and this strategy identifies how ORC will respond to all organisms that cause us harm. Harmful organisms may be 'pests', 'unwanted organisms' or 'organisms of interest'.



Pests

The 38 pest plants and animals in Otago's Pest Management Plan are legally declared as pests under the Biosecurity Act 1993. This means ORC can set enforceable rules to manage them. The Plan is reviewed every 10 years in accordance with the Biosecurity Act.

Organisms of interest

As described above, only some harmful organisms in Otago are designated as pests in Otago's Pest Management Plan, however many others present a biosecurity risk. We have compiled a list of organisms that are of interest to Otago and may be candidates for pest status in the future, depending on changes to their distribution or degree of impact, as well as the ability for us to successfully control these species.

Unwanted organisms

An unwanted organism is an organism declared under the Biosecurity Act 1993 that cannot be sold, propagated, bred, multiplied, communicated, released, caused to be released or otherwise spread. A database of unwanted organisms is administered by the Ministry for Primary Industries. The National Pest Plant Accord and the National Pest Pet Biosecurity Accord are also national registers of organisms that can be managed using the same controls. Unwanted organisms may be controlled at a national, regional or local level.





**PART TWO:
WHY A
BIOSECURITY
STRATEGY?**

2 WHY A BIOSECURITY STRATEGY?

2.1 BIOSECURITY ISSUES IN OTAGO

This strategy sets out ORC's biosecurity priorities for the Otago region. This includes different measures to protect our environment, economy and communities from the impacts of harmful organisms. This requires a coordinated regional effort if we are to make a difference.

Indigenous Biodiversity

Otago is one of the most biodiverse regions in New Zealand. From the albatross/toroa and yellow-eyed penguins/hoiho on the Otago Peninsula, to the endangered skinks/mokomoko of Central Otago and the cheeky kea of the Southern Alps. Not to mention the hundreds of indigenous lizards, birds, freshwater fish, plants, and marine species. Many species in Otago have a high level of endemism, and are found nowhere else on earth.

Our indigenous biodiversity contributes to our health, our economy, and our social and cultural wellbeing. However, what little remains is increasingly threatened by harmful organisms. Species such as rats and stoats predate on our native and often vulnerable or endangered ground-nesting and flightless birds. There are more than 400 weeds of conservation concern in New Zealand. In Otago, invasive plants like old man's beard smother and kill native vegetation if left uncontrolled and destroy vulnerable habitats. This biosecurity strategy seeks to manage the impacts of organisms that harm our environment and works in tandem with ORCs Biodiversity Strategy.

Takata Whenua values

Kāi Tahu are takata whenua of the Otago region. Kāi Tahu means the 'people of Tahu', linking them by name to their common ancestor Tahu Pōtiki. The Kāi Tahu tribal area extends from the sub-Antarctic islands in the south to Te Parinuiowhiti (White Cliffs, Blenheim) in the north and to Kahurangi Point on Te Tai o Poutini (the West Coast). Te Rūnanga o Ngāi Tahu (the iwi authority) comprises 18 papatipu rūnaka, of which four are in Otago. The four Otago rūnaka are Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Otakou, and Hokonui Rūnanga.

Harmful organisms can adversely affect the values of Kāi Tahu and rūnaka. Harmful aquatic species can affect mahika kai and Wai Māori. Predator species and invasive plant species adversely affect biodiversity that is significant to Kāi Tahu and can impact wāhi tūpuna.

The Kāi Tahu Natural Resources Management Plan contains a number of issues, objectives and policies regarding the control of biosecurity threats.

Economy

Agriculture is the basis of Otago's economy and is a major source of revenue. Tourism now provides more than a quarter of Otago's GDP, the highest proportion for any region. Otago's regional GDP in 2015 was \$10.2 billion, comprising 4.2% of national GDP. Tourism is also a key contributor to the Otago economy and employment, with biodiversity, landscapes, natural resources and geography important for both of these industries.

Harmful organisms increasingly have a major impact on Otago's economy. This costs the country billions of dollars in lost revenue and control. For example, pastoral weeds are conservatively estimated to cost the New Zealand economy \$1.2 billion per annum in lost production and control costs. In Otago, production pests such as ragwort can affect stock, and pests such as nodding thistle and nassella tussock can impact production values. Other species such as possums can spread viruses and diseases such as bovine tuberculosis. Wallabies and rabbits are significant production pests, where ORC invests considerable resource to manage the impacts of spread.

Case study: Rabbits

Rabbits were originally introduced to New Zealand by European settlers, but shortly spread out of control. They've remained one of the biggest pests in Otago ever since.

Rabbits impact pastoral production, particularly on extensive farming operations. Ten rabbits can eat as much grass as one sheep, and rabbit populations can explode quickly.

Controlling rabbits remains the responsibility of all landowners. Effective management of these pests requires all landowners, large and small, to keep rabbit numbers down on their property.



Photo reference:
LH: 01, RH: 02.

Landscape, amenity and recreation

Harmful organisms can reduce the community's enjoyment of natural areas by impacting access and restricting travel. They can destroy wilderness areas, affect our waterways and reduce animal, plant and fish numbers. This can impact the values of our landscapes, adversely affecting visual amenity for Otago's residents and visitors.

Tree species such as wilding conifers can completely transform vast landscapes. Gorse and broom can restrict access to rivers, making it difficult for people fishing and picnicking. Aquatic weeds such as lagarosiphon, didymo and lake snow can impact where we can swim and recreate.

Case study: Wilding conifers

A national collaborative model has been established to prevent the spread of, and to progressively remove, wilding conifers from certain areas, through the National Wilding Conifer Control Programme.

In Otago, this effort has seen nearly 300,000 hectares cleared over the last few years on the back of a partnership effort between ORC, government agencies, local councils, landowners and community groups like the Central Otago Wilding Conifer Control Group and the Wakatipu Wilding Conifer Control Group.

Photo reference: RH: 03



2.2 OTAGO REGIONAL COUNCIL'S ROLE IN BIOSECURITY

ORC provides regional leadership to manage biosecurity issues in Otago, working closely with takata whenua, communities, central and local government and other key agencies and groups. The legislation and policy instruments that underpin or authorise ORC's biosecurity-related programmes and activities are summarised below.

The Biosecurity Act 1993

The Biosecurity Act 1993 (the Act) mandates regional councils to provide "...leadership in activities that prevent, reduce, or eliminate adverse effects from harmful organisms that are present in New Zealand (pest management) in their region". This includes:

- (a) promoting the alignment of pest management in the region;
- (b) facilitating the development and alignment of regional pest management plans and regional pathway management plans in the region;
- (c) promoting public support for pest management; and
- (d) facilitating communication and co-operation among those involved in pest management to enhance effectiveness, efficiency, and equity of programs (section 12B(2) of the Act).

The Act is enabling and any regional council involvement in pest management activities is at the Council's discretion. ORC is involved in various national control programmes, including for wilding conifer control, didymo and lake snow.

However, the imposition of any rules or regulatory powers under the Act requires the preparation of a regional pest management plan, pathway management plan or small-scale management programme (pest plans).

The National Policy Direction is a regulation that sets out additional requirements for the development of pest plans. This includes requirements to ensure that they are cost effective (the benefits outweigh the costs), all pest plans align, how to set good neighbour rules and direction on how plans must be prepared.

Proposed Otago Regional Pest Management Plan

The Pest Management Plan provides a regulatory framework for efficient and effective management or eradication of 38 animal and plant pest species to reduce the adverse effects of these pests and to maximise the effectiveness of pest management action by providing a regionally coordinated approach. These pests will be managed on a regional or site led basis.

Not all organisms that cause harm are managed by the Pest Management Plan. Some species may already be managed by a different agency or might be better suited to a different management approach, or the costs of managing the organism may outweigh the benefits of doing so.

Pathway management plans and small-scale management programmes

Pathway management plans set rules to prevent harmful organisms from being transported into new or different areas. There are no regional pathway management plans in Otago. However, these may be developed in the future and could apply on a regional or multi-regional basis. ORC will investigate the potential for pathway plans, including for marine species.

Small-scale management programmes can be utilised for any unwanted organism. To undertake a small-scale programme, ORC must prepare a public notice, and can then immediately undertake direct control without needing to prepare or review a pest plan. Section 100 of the Act sets out these criteria. This includes being satisfied that without action the organism could cause serious impacts, and that it can be effectively eradicated or controlled within three years.

Other legislation, plans and strategies

The Local Government Act 2002 (LGA) sets out the statutory purpose of district and regional councils and the Long Term Plan (LTP) process provides a framework for the direction and priorities of each local authority. Through LTPs, councils secure funding for their activities in consultation with their communities. This includes funding for biosecurity activities.

Regional councils also have responsibilities under the Resource Management Act 1991 (RMA) for natural and physical resources. Adverse effects are managed through regional policy statements, regional and district plans, and resource consents. Regional policies and plans can manage activities so that they do not create or exacerbate biosecurity risks. ORC's Regional Policy Statement contains policies and methods to manage biosecurity effects.

Otago Biodiversity Strategy

ORC has also recently adopted a regional Biodiversity Strategy which outlines actions and programmes that ORC will lead or participate in to achieve improved biodiversity outcomes. The control of harmful organisms makes a significant contribution to biodiversity outcomes. This will be recognised in the implementation of the Biosecurity Strategy and Biodiversity Strategy, by ensuring integrated outcomes are achieved across the two.

2.3 THE ROLE OF OTHER AGENCIES

Other agencies and groups also have statutory roles and obligations and undertake action in relation to biosecurity. As part of this strategy, the ORC is seeking not to duplicate the work of other agencies and groups, but rather identify activities and programmes to work collaboratively, provide support and add value where appropriate.



Central government: managing risk offshore, developing international standards and rules, trade and bilateral agreements, monitoring emerging risks, setting import health standards.



Ministry of Primary Industries: Intercepting biosecurity risks at the border, verifying compliance with the rules. National readiness, surveillance response and management. Department of Conservation and Land Information New Zealand also carry out national and multiregional coordinated control.



Otago Regional Council: Eradication, containment and control of pests and diseases within and between regions. This involves participating in national and multiregional initiatives with government ministries/departments, organisations and regional councils.



Individuals, groups, Territorial Authorities and organisations: Protecting the places that we value. New actions are identified in this Strategy so that ORC further supports biosecurity initiatives at a local level.

Ministry for Primary Industries

The Ministry for Primary Industries (MPI) is the Government department charged with leadership of New Zealand's biosecurity system. MPI has the lead role in administering the Biosecurity Act and undertaking pest and disease surveillance. MPI's responsibilities include preventing the introduction and spread of new species to New Zealand. Key MPI policies/plans include The National Policy Direction for Pest Management 2015 (National Policy Direction), the Biosecurity 2025 Direction Statement and the Pest Management National Plan of Action 2010. MPI lead national and sub-national responses to biosecurity incursions.

The Department of Conservation

The Department of Conservation (DoC) is funded and empowered to manage pests and harmful organisms on public conservation land and is the principal central government agency involved in the conservation of biodiversity. DoC's role is broad and multifaceted, operating under the Conservation Act 1987, the National Parks Act 1980, the Wildlife Act 1953, the Wild Animal Control Act 1977, and the Reserves Act 1977.

DoC's statutory responsibilities include managing public conservation land, freshwater fisheries (including pest freshwater fish under the Freshwater Fisheries Regulations 1983), and the control of wild deer, chamois, thar, goats and pigs under the Wild Animal Control Act 1977. DoC is also required to control pests on land that they occupy or administer in accordance with any good neighbour rules in the Pest Management Plan.

Territorial Authorities

Otago is made up of five territorial authorities: Dunedin City Council, Clutha, Central Otago, Queenstown Lakes and Waitaki District Councils. Waitaki District straddles both the Otago and Canterbury regions.

Each territorial authority manages council reserves and undertakes direct management of harmful organisms impacting on reserves and other council administered land, within that territory. Territorial authorities are also road controlling authorities in their district. They are required to control pests on land that they occupy or administer in accordance with the Pest Management Plan rules.

KiwiRail

KiwiRail is the Crown agent responsible for managing New Zealand's railway infrastructure. KiwiRail is required to control pests on land that they occupy or administer in accordance with the Pest Management Plan rules.

Land Information New Zealand

Land Information New Zealand (LINZ) manages over 5,000 properties across New Zealand, totalling almost two million hectares and 8% of New Zealand's land area. These include high country pastoral leases, Crown forest licensed land, former railway properties and the beds of many lakes and rivers. LINZ is responsible for biosecurity on land under its management and works collaboratively with other parties in undertaking its pest control programmes. This includes controlling pests in accordance with any good neighbour rules set out in the Pest Management Plan.

Predator Free 2050

Predator Free 2050, led nationally by the Predator Free New Zealand Trust, has a goal to rid New Zealand of the most damaging introduced

predators that threaten our natural taonga, our economy and primary sector. Ridding New Zealand of possums, rats and stoats by 2050 is a nationwide goal, with new techniques and a co-ordinated effort across communities, iwi, and public and private sectors.

At a local level, predator control initiatives are underway across Otago. This varies from smaller scale projects to large landscape scale initiatives in different areas across the region.

Predator Free Dunedin is a collaboration of 20 stakeholders working together to implement predator free objectives across large landscape scale projects on Otago Peninsula, North Harbour/Mt Cargill and the Dunedin urban area. The Pest Management Plan and this strategy supports the delivery of these predator free objectives and seek to support smaller scale and other landscape scale projects too.

Groups, industries and individuals

Everyone has responsibilities for pest management. At the individual level, people manage their land to keep it free of weeds and pests, particularly where this benefits them. Everyone is bound by the requirements in the Biosecurity Act for unwanted organisms and private land occupiers are required to control pests in accordance with the Pest Management Plan rules. There are many groups and non-governmental organisations in Otago that also play a key role in biosecurity management by undertaking voluntary management as part of biodiversity projects and site led initiatives.

At an industry level, industries such as OSPRI and Kiwifruit Vine Health, have prepared and are implementing national pest management plans under the Biosecurity Act. Other examples include the Plant Nurseries Association involvement in the National Pest Plant Accord, and Port Otago's involvement in marine pest surveillance and management.

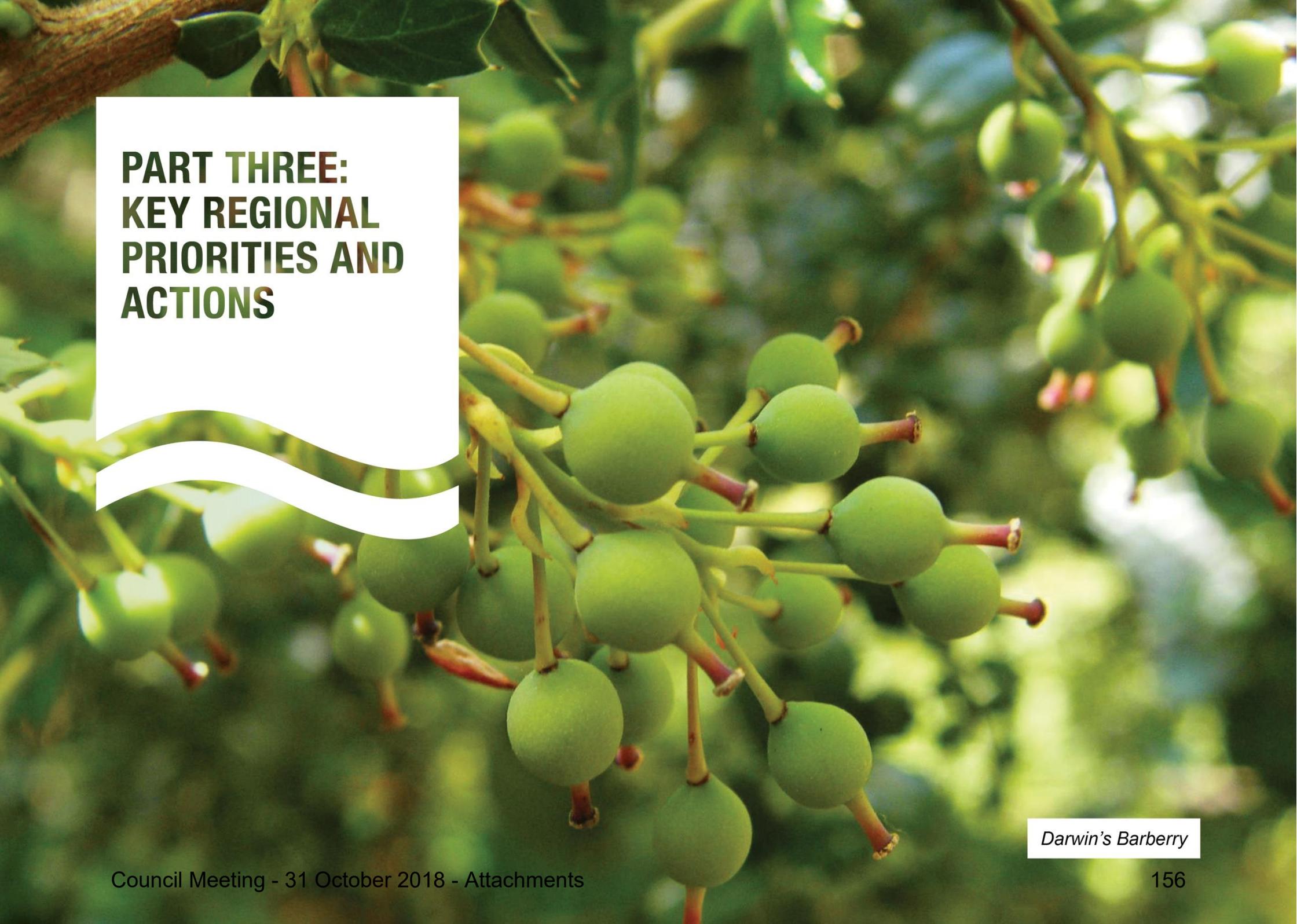
Case study: OSPRI

OSPRI is a partnership between the primary industry sector and the government. OSPRI's TBfree programme aims to eradicate bovine tuberculosis affecting stock.

A core component of this is the control of possums. Possums are very susceptible to TB and the disease can spread quickly in them. This makes controlling possum numbers, particularly in areas where TB is prevalent, a key component of OSPRI's work. Infected herds have reduced nationally from over 300 in 2003 to 54 in 2017.

Photo reference:
LH: 04, RH: 05



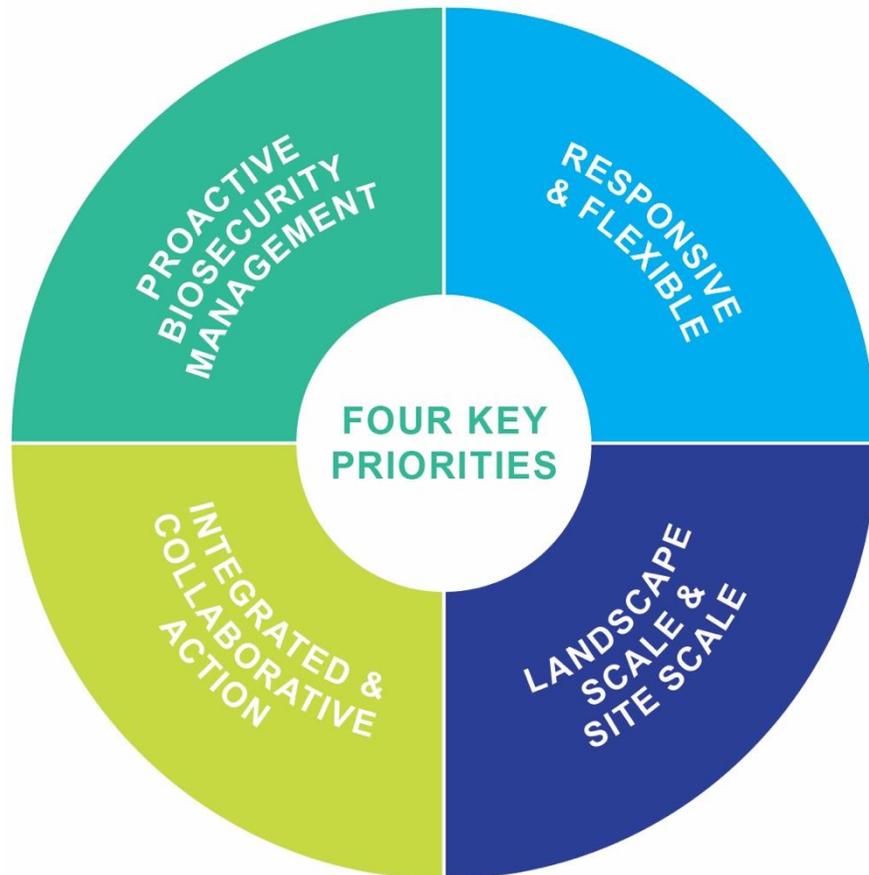


**PART THREE:
KEY REGIONAL
PRIORITIES AND
ACTIONS**

Darwin's Barberry

3 KEY REGIONAL PRIORITIES AND ACTIONS

To achieve our long-term goal for biosecurity in Otago, four key regional priorities have been identified. Each of the four key priorities have a series of actions that inform how ORC will undertake biosecurity management over the next 10 years.



3.1 PROACTIVE BIOSECURITY MANAGEMENT: ADDRESSING ISSUES BEFORE THEY BECOME SIGNIFICANT

ORC's first key priority is proactive biosecurity management. This means addressing biosecurity issues before they become significant. ORC has a number of management options, and the most appropriate response will depend on the nature of the organism, the potential risk, and the effectiveness of the options available to respond. These actions include:

Action 3.1.1 Managing pathways

- **Advocate for the preparation of national and sub-national pathway management plans** where rules are needed to prevent harmful organisms from being transported into new or different areas.
- **Actively advocate for a national marine pathway management plan** to minimise the risk of marine pests being spread throughout the coastal marine area within Otago and between regions.

Action 3.1.2 Excluding harmful organisms from Otago

- **Undertake research and surveillance for exclusion pests** in ORC's Pest Management Plan. Where neighbouring councils manage or exclude the same species, work collaboratively on research and surveillance where it is efficient and effective to do so.
- **Undertake risk assessments of other harmful organisms** that are not yet present in Otago but may have the potential to cause significant harm if they were established. As above, collaborate with neighbouring councils where they are also investigating the same species.
- **Utilise the rules and powers in the Pest Management Plan to eliminate incursions** where exclusion pests are discovered in Otago.

- **Utilise the Biosecurity Act to implement small-scale programmes** where an unwanted organism that was not previously present in Otago is now present, and without direct action, the organism could cause serious impacts.

Case study: Marine pests in Otago

Otago Harbour is highly valued by the community and a vital transport hub for the region. This means it is also subject to high traffic, which can spread marine pests.

Recent surveys of the Harbour have not identified any 'new-to-New Zealand' pests. However, already established marine pests like clubbed tunicate and Japanese seaweed remain present.

In addition to managing these pests, we need to ensure new pests don't become established. ORC is advocating for a national marine pathway management plan to provide a coordinated and effective management approach to marine pest spread.

Action 3.1.3 Eradicating pests from Otago

- **Within the 10 year life of the Pest Management Plan, eradicate rooks and spiny broom** from Otago. Once eradicated, update their status in the Pest Management Plan to exclusion species and continue surveillance to prevent any new incursions.
- **Within the 10 year life** of the Pest Management Plan, eradicate possums from Otago Peninsula. Once eradicated, identify new areas for possum eradication.
- **Investigate the potential to eradicate one or more of the species** listed in the Pest Management Plan as progressive containment species, once the species above are eradicated.

Action 3.1.4 Investing in research and development

- **Monitor the state of the environment**, including the impacts of harmful organisms on biodiversity and water quality.
- **Contribute to and facilitate regional, national and international research** on biological controls for harmful organisms.
- **Prioritise this research to target harmful organisms** that have the greatest threat to the Otago region, and where possible, work collaboratively with other organisations so that research is cost effective to ORC and can be of value to more people.
- **Advocate and educate people and communities on the best technologies available** and new innovations to manage harmful organisms where these provide more efficient, effective, and humane control techniques.

3.2 RESPONSIVE AND FLEXIBLE: UTILISE THE MOST EFFICIENT AND EFFECTIVE METHODS TO CONTROL HARMFUL ORGANISMS
 ORC's second key priority is to be responsive and flexible in delivering biosecurity outcomes. This means managing harmful organisms in the most efficient and effective way, and ensuring biosecurity outcomes are incorporated into all ORC's strategies, plans, and projects. It also means being adaptable to changing situations and taking a precautionary approach when little is known.

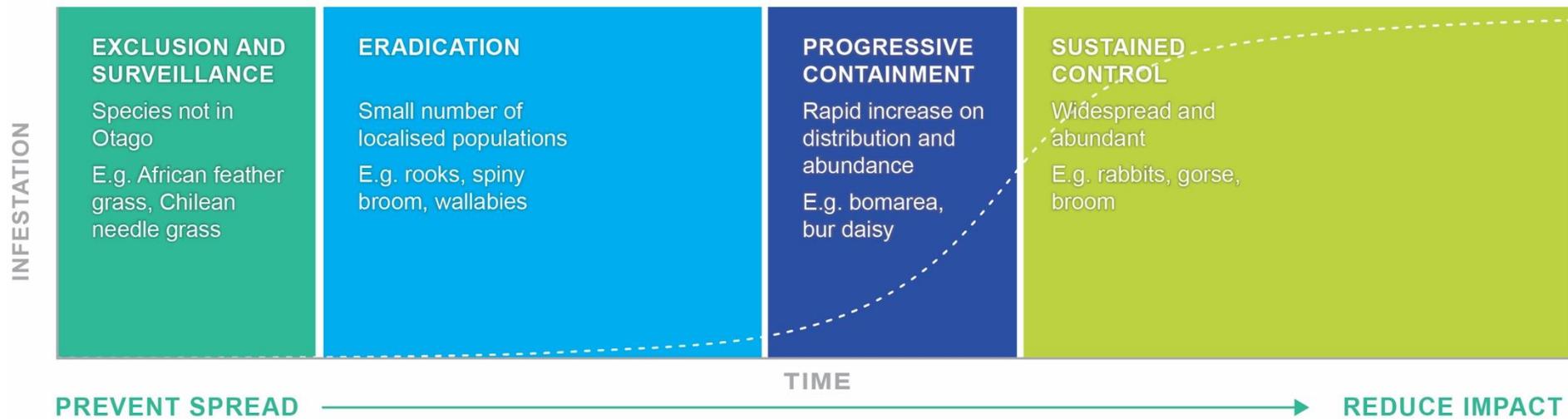
The pest infestation curve is used in New Zealand to help determine the most appropriate management option. The position of a species on this curve directly relates to the cost effectiveness of eradicating or controlling it. The lower the species is on the curve, the more cost effective it is to eradicate or control. ORC uses this continuum to help decide how to best manage harmful

Case Study: Eradicating rooks from Otago

Rooks can damage cereals, new crops and pasture. Over the last few decades ORC has successfully reduced rook numbers from an estimated 150 birds in 2006 to less than 40 birds today. ORC aims to completely eradicate rooks from Otago within the next 10 years.



Photo reference: 06



Action 3.2.1 Administer the programmes in the Pest Management Plan

- **Undertake monitoring and surveillance of all pests** in the Pest Management Plan and administer the rules to achieve the Plan's objectives.
- **When administering the rules of the Pest Management Plan, work proactively with landowners and occupiers** to help them understand what rules apply to their land, what their responsibilities are, and give them advice and support on control options.
- **Utilise ORC's Exemption Powers under the Biosecurity Act**, where a flexible approach is required to effectively manage pests in the Pest Management Plan, and where landowners and occupiers meet the criteria set out in section 78 of the Act.

Action 3.2.2 Be flexible in responding to biosecurity issues outside the Pest Management Plan

- **Support owners and occupiers by providing advice and information** on how to control harmful organisms that are not listed in the Pest Management Plan.
- **Provide additional guidance on the ORC website** about how to manage harmful organisms. This will include information on surveillance and identification, and control measures.
- **Develop internal guidelines for biosecurity staff** to inform the most efficient and effective response to biosecurity issues that arise.
- **Support incursion or management responses by other agencies**, including MPI, LINZ, DoC and other agencies where appropriate.

Action 3.2.3 Apply an 'all of council' approach to biosecurity at Otago Regional Council

- **Ensure ORC's strategies and plans provide for improved biosecurity outcomes** in objectives, policies, rules and methods.
- **Consider and bolster where possible biosecurity outcomes** when undertaking and implementing ORC works and projects in other areas.
- **Strategically align ORC projects that provide biosecurity benefits** to apply an integrated and multi-level approach, particularly where these relate to site or landscape-scale projects and biodiversity outcomes.

Action 3.2.4 Regularly report on biosecurity issues and successes

- **ORC will prepare an operational plan** in accordance with section 100B of the Biosecurity Act that sets out how ORC will administer the Pest Management Plan and biosecurity actions over the coming 12 months, and update and report on the plan outcomes on an annual basis.
- **Investigate new ways to share information on biosecurity issues and successes with communities.** This will include investigating how spatial information can be shared, such as monitoring and trapping programmes, and simple innovative ways to report on progress.

3.3 INTEGRATED AND COLLABORATIVE ACTION: WORKING WITH ALL PARTIES AT ALL LEVELS

ORC's third key priority is to provide an integrated and collaborative approach in delivering biosecurity outcomes. This means actively advocating for, and participating in, biosecurity initiatives and projects at all levels; from national and sub-national projects, to regional and district partnerships, to supporting and empowering communities and individuals.

Case study: Lindis Pass Conservation Group

The Lindis Pass Conservation Group received \$4,713 of ORC funding to go towards tools, protective clothing and a chemical handler certificate to push back and contain invasive sweet brier in Lindis Pass Scenic Reserve. The Lindis Pass Conservation Group is made up of community volunteers who have a passion for the area. Their mission is to enhance and promote the natural conservation, landscape and recreational values of the Lindis Pass. The tools are essential to enable the volunteers to safely and efficiently carry out weed control through cutting and poisoning these clusters of dense, thorned shrubs.



Action 3.3.1 Actively advocate for and participate in national and sub-national initiatives with MPI and others

- **Actively advocate for national and sub-national management plans** to control unwanted organisms that require a multi-regional approach to most efficiently and effectively control the species.
- **Participate in other national and sub-national initiatives** to effectively control unwanted organisms that require a consistent and coordinated multi-regional approach.
- **Form collaborative partnerships with neighbouring regional councils** where councils have shared biosecurity goals; particularly where these relate to specific species, or site or landscape-scale projects.

Action 3.3.2 Work cooperatively and in partnership with territorial local authorities, DoC, LINZ and other key agencies on initiative to control harmful organisms

- **Actively advocate for improved biosecurity outcomes in district plans** and strategies to reduce the impacts of harmful organisms within Otago's districts.
- **Work in partnership with territorial local authorities, DoC, LINZ and other key agencies** on biosecurity initiatives where this provides more efficient, effective and collaborative outcomes and optimises control.

Action 3.3.3 Support and work in partnership with Kāi Tahu on initiatives to control harmful organisms impacting on cultural values

- **Engage with Kai Tāhu regularly on biosecurity issues** to identify where Kai Tāhu may have an interest in biosecurity initiatives and how they wish to be involved.

- **Partner with Kāi Tahu on biosecurity initiatives** to address issues that impact on cultural values.

Action 3.3.4 Support and empower Otago's people and communities to control harmful organisms

- **Provide funding and support to people and communities involved in volunteer initiatives** that optimise the control of harmful organisms to provide improved biodiversity, landscape, amenity, cultural and social outcomes.
- **Showcase and celebrate significant case studies and achievements** where communities and groups have provided improved biodiversity, amenity, cultural and social outcomes.
- **Empower individuals and communities** to actively control harmful organisms on their land and in their area by providing education, information, facilitation, support and training.

Case study: Otago Peninsula Biodiversity Group

With the help of more than 60 regular volunteers, Otago Peninsula Biodiversity Group (OPBG) have now removed more than 12,500 possums from the Otago Peninsula. OPBG received \$27,000 from ORC so they could trial a pest aversion fence on a farm as a future biosecurity tool for managing pest species reinvasions. The funding also went towards analysis of trends, environmental monitoring data for birds, vegetation, and rodents, a base-line survey of lizard species' relative abundance and distribution on the Peninsula, and also contributed to the ongoing inventory of invertebrate species on the Peninsula. OPBG has been working hard for over six years to reduce possum numbers for the benefit of native flora and fauna.

Photo reference: L-R: 07, 08, 09



3.4 LANDSCAPE SCALE AND SITE SCALE: TARGET KEY AREAS FOR COLLABORATIVE AND COORDINATED CONTROL

ORC’s final key priority is to provide for collaborative and coordinated biosecurity control in key areas to protect significant environmental, social and recreational values. This means working together with other government agencies, organisations, interested parties and volunteers to better protect our special places from harmful organisms. This also means providing regional leadership and support for these initiatives.

Landscape scale and site scale initiatives can be progressed in several different ways:

Site-led programmes in the Pest Management Plan	How to add new site-led programmes to the Plan	Other site and landscape scale initiatives
For existing larger scale initiatives.	For new and future larger scale initiatives.	For smaller scale initiatives.
ORC has committed to four large scale site-led programmes in the Pest Management Plan.	Appendix 2 sets out how new site-led programmes can be included in the Pest Management Plan.	Further actions also set out how other smaller site and landscape scale initiatives can be developed or supported.

Site-Led Programmes in the Pest Management Plan

ORC has committed to four site-led programmes in the Pest Management Plan. The three site-led programmes in Dunedin are interrelated projects

to reduce the impact of harmful organisms on indigenous biodiversity. The site-led programme for lagarosiphon seeks to continue ORC’s support for collaborative lagarosiphon management projects led by LINZ and with input from other key parties.

New site-led programmes in other areas in Otago may be included in the Pest Management Plan over time. The criteria in Appendix 2 sets out how ORC will consider any new site-led programmes.

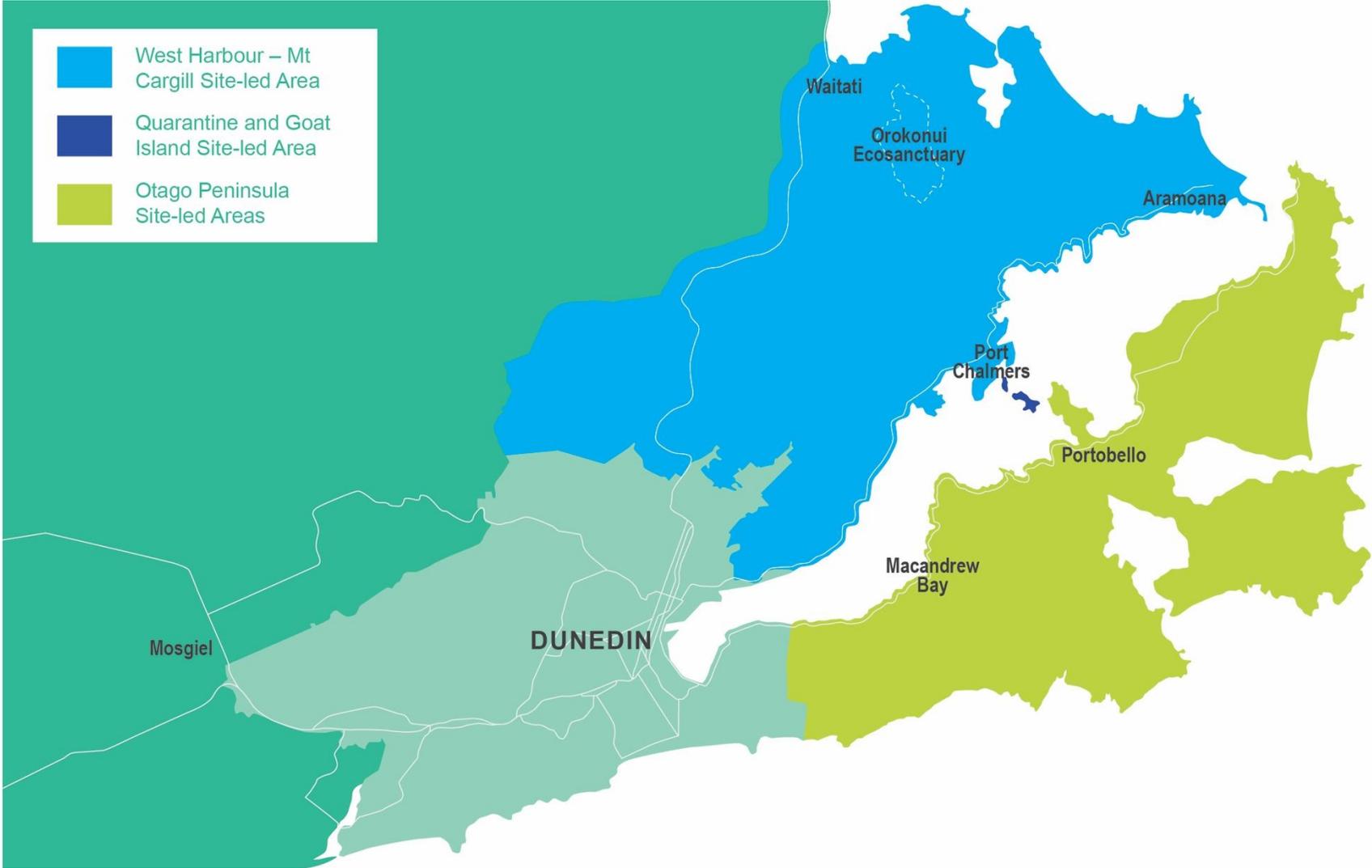
The Otago Peninsula

Not-for-profit groups have worked on the Peninsula for more than 10 years to protect indigenous biodiversity that call the Peninsula home. In collaboration with local and central government agencies, many residents are part of coordinated efforts to manage harmful predators and plants.

The Otago Peninsula site-led programme in the Pest Management Plan will support existing efforts to protect the important biodiversity values on the Peninsula. This includes ORC supporting the control of banana passionfruit, Chilean flame creeper, Darwin’s barberry, sycamore, gunnera, tradescantia, Bennett’s wallaby, feral cat, feral deer, feral goat, feral pig, hedgehogs and mustelids, and eradicating possums.

The Otago Peninsula is 9,000ha in area and stretches parallel to the Dunedin mainland. The Peninsula is steep and hilly, with tidal inlets, long sandy beaches, coastal cliffs and many small bays. Small towns are dotted along the western harbour edge. The Ōtākou Marae is located near Harrington Point. The Peninsula’s biodiversity attracts many local, national and international visitors.

The Otago Peninsula, West Harbour – Mt Cargill and Quarantine and Goat Island Site-led Areas



Tairoa Head at the tip of the Peninsula hosts the only mainland colony of albatross in the world, the endangered northern royal albatross/toroa. The Peninsula is also home to one of the rarest penguins in the world, the endangered yellow-eyed penguin/hoiho. The rare New Zealand sea lion/whakahao has returned to the mainland after being hunted to local extinction by early sealers and has established its first mainland breeding area on the Peninsula's southern beaches. Elephant and fur seals/kekeno are also found there, along with the Otago shag and other endemic shore and seabirds.

The Peninsula's forest remnants are home to populations of some of our smallest birds, including rifleman, brown creeper and tomtit. The Peninsula is also home to five reptile species, including the at-risk jeweled gecko, along with the recently discovered inconspicuous skink and the locally rare and at-risk green skink. The Peninsula is also home to many native invertebrates.

West Harbour – Mt Cargill

This site-led programme supports and builds on the significant momentum of the Orokonui Halo Project, a collaboration between the Landscape Connections Trust, OSPRI and Otago Natural History Trust. The Orokonui Halo Project is a response to predator pests threatening the Orokonui Ecosanctuary, surrounding indigenous biodiversity, and impacting on local farmers. As threatened bird species within the ecosanctuary flourish and slip over into the surrounding area, they are also put at risk by predator pests outside the sanctuary.

This site-led programme will support the coordinated efforts of the groups and volunteers involved to improve biodiversity and habitats in this area. This includes ORC supporting the management of banana passionfruit,

Chilean flame creeper, Darwin's barberry, tradescantia, Bennett's wallaby, feral cat, feral deer, feral goat, feral pig, mustelids, and possums.

The West Harbour – Mt Cargill site-led area covers approximately 12,500ha on the western side of Otago Harbour. The 302ha Orokonui Ecosanctuary is at the core of the project area, and with intensive predator control, acts as the nucleus for the expansion of indigenous wildlife across the site-led area and wider city and hinterland. The site-led area is a mix of beaches and inlets, the harbour edge, small towns like Port Chalmers and Pūrākanui, lifestyle blocks and hobby farms, larger landholdings, forests and native bush.

The area is home to 11 naturally uncommon ecosystem types, including coastal turfs, ephemeral wetlands, volcanic boulder fields, lagoons and estuaries. The area is also home to the endangered yellow-eyed penguin/hoiho, the rare New Zealand sea lion/whakahao, and the New Zealand fur seal/kekeno. There are 11 threatened bird species, including the South Island kaka and the South Island robin, and nine at-risk bird species including the Southern blue penguin and the South Island fernbird. The at-risk jeweled gecko and green skink, and threatened freshwater species are also found here.

Quarantine Island and Goat Island

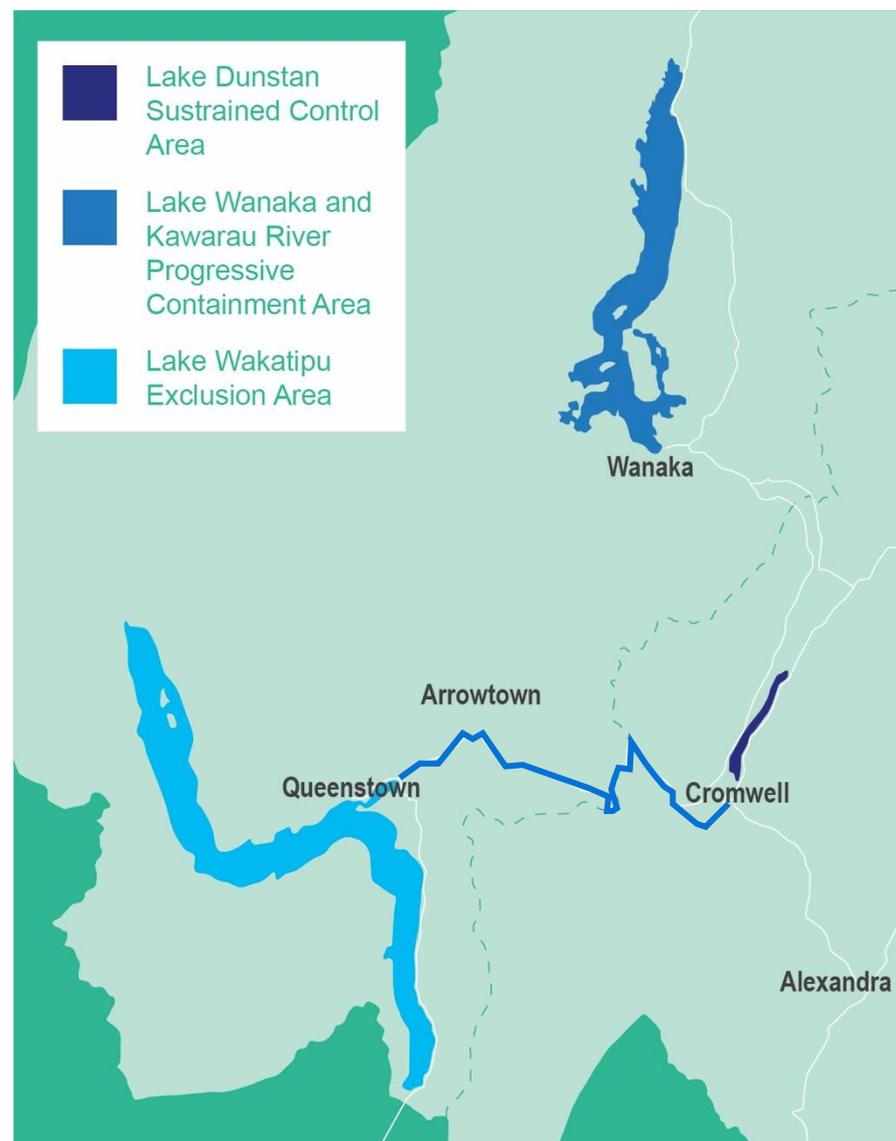
Quarantine Island and Goat Island are located in the Otago Harbour. These islands provide stepping stones for bird species, but also for rat species and mustelids to move from one side of the harbour to the other by either swimming or on board small boats/kayaks. The Norway rat and the house mouse are present on Quarantine Island. The key community outcome for the island is to eradicate rats, and to ensure that the island remains free from other pest animals.

Action 3.4.1 Provide regional leadership and support for the site-led programmes in the Pest Management Plan to protect indigenous biodiversity

- **Provide regional leadership and advocacy, and support community leaders** for the Otago Peninsula, West Harbour – Mt Cargill, and Quarantine Island and Goat Island site-led programmes.
- **Support the development of ‘whole of site’ management plans** for the Otago Peninsula, West Harbour – Mt Cargill, and Quarantine Island and Goat Island.
- Within each ‘whole of site’ management plan, **support the identification of smaller sites for specific objectives and activities** to protect the significant values of that place and encourage landowner participation in these initiatives.
- **Support the delivery of site-led objectives** by assisting and facilitating groups to undertake control works, undertaking monitoring of key species, leading some of these activities where needed, and undertaking control works where there are barriers to landowner participation.

Site-led programmes in the Pest Management Plan to manage the spread of lagarosiphon

The site-led programme seeks to continue ORC’s support for collaborative lagarosiphon management projects led by LINZ and supported by other key parties. Lagarosiphon can be spread by currents and by boats and equipment. Its vigorous growth means that it can quickly shade out and outcompete native species, affecting ecosystems and the ability for people to swim, boat and use the water for recreation. It can also affect water supply intakes.



Lagarosiphon is present in Lakes Dunstan and Roxburgh and parts of Lake Wanaka. It is also present in the Clutha River/Mata-Au and the Kawarau River. Isolated, individual plants are regularly removed from Frankton Arm in Lake Wakatipu to prevent it spreading to the lake.

Most of Otago's lake beds and rivers are administered by LINZ in accordance with the Land Act 1948. The current areas of focus for the control of lagarosiphon are Lake Dunstan, Lake Wanaka and Lake Wakatipu. LINZ has developed 10 Year Lagarosiphon Management Plans for each of these lakes, in collaboration with key parties including ORC, and control works are undertaken in accordance with these management plans. The control works for these programmes are largely funded by LINZ, with some support from other parties and ORC.

The site-led programme for lagarosiphon in the Pest Management Plan requires that these control works continue so that it is controlled in Lake Dunstan to keep important recreation areas clear, its extent is reduced in Lake Wanaka and the Kawarau River over time, and it is kept out of Lake Wakatipu. ORC will continue to support these programmes and advocate to LINZ for long-term suppression of lagarosiphon in Otago and, over time, eradication in key areas.

Action 3.4.2 Advocate and support the continued suppression of lagarosiphon in Otago's lakes and rivers

- **Support LINZ in the development and review of 10 year Lagarosiphon Management Plans** for the control of lagarosiphon in Otago's lakes and rivers.
- **Continue to support and participate in Check, Clean and Dry campaigns** and advocate for campaign activities to be undertaken in additional areas to further prevent spread.

- **Continue to provide funding to lagarosiphon management** where this supports coordinated action, whilst recognising that LINZ is the key agency undertaking management.
- **Work collaboratively with LINZ on lagarosiphon surveillance** in Otago's lakes and rivers so that potential areas of spread are monitored, and control works are undertaken by LINZ as necessary.

Action 3.4.3 Other site and landscape scale initiatives

The site-led programmes proposed in the Pest Management Plan seek to support and further bolster existing initiatives where ORC can work in collaboration with key parties. This does not preclude the ability for ORC to support new site and landscape scale initiatives, whether these are long-term projects over large areas, or shorter-term and smaller-scale projects across a smaller area. Particularly where these projects will result in improved biodiversity outcomes.

- **Consider the inclusion of new site-led programmes in the Pest Management Plan** where these can support collaborative and sustained medium term (10 years+) action across a highly valued site or landscape.
- **Provide the ability to include new site-led programmes without a plan review** to the Pest Management Plan in accordance with the guidelines in Appendix 5.4.
- Support, facilitate and participate in other non-regulatory landscape scale approaches to manage harmful organisms.
- Provide facilitation support to smaller, non-regulatory site-based approaches at a community, group and individual level where appropriate.

PART FOUR: IMPLEMENTATION



4 IMPLEMENTATION

4.1 IMPLEMENTATION OF THE BIOSECURITY STRATEGY ACTIONS

The actions contained in Section 3 of this strategy outline how ORC will deliver its regional leadership role, and guides ORC's biosecurity projects and activities. ORC commits to operating in accordance with these actions to mitigate the impacts of harmful organisms over the next 10 years.

In doing this, a number of priority projects and activities have been identified for action over the next five years. This does not negate ORC's responsibility to deliver all the actions within the strategy over time, but seeks to address current issues and opportunities that have been identified in the development of this strategy and the Pest Management Plan.

ORC will prepare an operational plan in accordance with section 100B of the Biosecurity Act that sets out how ORC will administer the Pest Management Plan and the other biosecurity activities outlined in the strategy over the coming 12 months. This will be updated and reported on annually.

This strategy will be reviewed and updated if required after the first five years and subsequently thereafter. New projects and activities may be identified and prioritised, and the outcomes of these reviews will also be used to inform the 10 year review of the Pest Management Plan.

4.2 PRIORITY PROJECTS FOR THE FIRST FIVE YEARS OF THE STRATEGY

In addition to the more general outcomes in this strategy that guide ORC's biosecurity activities, the following section identifies key projects and actions within the first five years of implementation to address important issues and opportunities that have been identified while developing the Pest Management Plan and this strategy.



Proactive Biosecurity Management

Key project / action	Partner / support	Timeframe
Establish and facilitate a biosecurity technical working group to meet twice a year to share ideas and innovations, identify synergies and collaborate on projects.	DoC, MPI, farming, industry, tourism and environmental organisations, Kāi Tahu	Within 1 year
Develop a Possum Control programme focusing on OSPRI completed areas for long-term bovine tuberculosis eradication and biodiversity gains. A volunteer landowner programme is anticipated, starting with the Pest Management Plan site-led areas, informed by successful models in other regions.	OSPRI, Landowners, Other regional councils	Within 18 months
Partner with other regional councils to actively advocate for a national marine pathway management plan to minimise the risk of marine pest spread. If a national plan is not instigated, look to partner with adjacent councils to develop a sub-national plan.	MPI, DoC Other regional councils	Within 3 years
Establish a surveillance programme for exclusion pests in partnership with neighbouring regional councils where this is efficient and effective. The surveillance programme could also include organisms of interest where these require ORC surveillance.	Neighbouring regions	Within 2 years

Responsive and Flexible

Key project / action	Partner / support	Timeframe
Prepare updated internal operating procedures for administering the Pest Management Plan for enforcing plan rules, working proactively with land occupiers, and utilising the exemption powers under the Biosecurity Act.		Within 12 months
Prepare new guidance material for the ORC website as a 'pest hub' on the identification, effects and control methods for pests and harmful organisms. Priority species for the first year includes the species in the Pest Management Plan, aquatic weeds and hieracium.	Neighbouring regional councils where appropriate, DoC	Over the next 5 years
Implement a transition programme for land occupiers within the new gorse and broom free areas and for land containing contorta pine shelters belts and planted conifers under 1ha within the wilding conifer control areas, to assist with proactive management prior to new rules being established.		Within 2 years

Develop guidance material on identifying other wilding trees within Otago in addition to wilding conifers, and produce guidance on control and replacement species.	DoC	Within 3 years
Develop and facilitate an urban gorse and broom programme throughout Otago.		Within 5 years
Develop a programme to facilitate the establishment of landowner-led rabbit control groups. This shall be modelled on best practice examples within Otago and other regions.	Other regional councils, DoC Maniototo Pest Management Company	Within 1 year

Integrated and Collaborative Action

Key project / action	Partner / support	Timeframe
Support the enviro schools programme with key messages, information and tools relating to biosecurity issues in Otago.	District enviro school coordinators	Within 1 year
Promote the newly developed ECO Fund to individuals, groups and non-governmental organisations involved in voluntary initiatives.		Within 6 months
Develop and implement a volunteer facilitation programme to support community volunteer groups in undertaking biodiversity projects and biosecurity control.	DoC	Within 2 years
Develop a shared data platform for biodiversity and biosecurity activities that can be used by ORC staff, community groups and enviro schools to share and analyse information, issues, successes, surveillance and monitoring.	Other district and regional councils, groups, DoC, Kāi Tahu	Within 3 years
Actively advocate for and co-lead the development of national or multi-regional pest management responses to address multi-regional impacts of particular species. e.g. wallabies.	Other regional councils, MPI	Within 2 years

Landscape Scale and Site Scale

Key project / action	Partner / support	Timeframe
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Contribute to the development of the Predator Free Dunedin 2050 'whole of site' management plan/s.	Predator Free Dunedin 2050, Landscape Connections Trust, Otago Peninsula Biodiversity Trust	Within 12 months
<p>Following the establishment of the above plan, establish a plan of action for ORC's role in the delivery of the plan outcomes. This shall set out ORC's role in:</p> <ul style="list-style-type: none"> • undertaking control works; • monitoring of key species; • providing guidance on predator prey relationships and how these should be addressed when undertaking control works (e.g. mustelid / rabbit pest control relationship); • leading some of these activities where needed; and • directly undertaking control where there are barriers to landowner participation. 	Predator Free Dunedin 2050, Landscape Connections Trust, Otago Peninsula Biodiversity Trust	Within 18 months of the above action
Work in partnership with Dunedin City Council on its landscape scale urban linkages plan to support Predator Free Dunedin.	Dunedin City Council, Predator Free Dunedin 2050	Within 5 years
Develop guidance on how ORC can support groups with smaller site-led initiatives to manage harmful organisms.		Within 12 months

APPENDIX 1: HARMFUL ORGANISMS IN OTAGO

PESTS IN THE PEST MANAGEMENT PLAN

Common Name	Scientific Name	Primary Programme
Plants		
African feather grass*	<i>Pennisetum macrourum</i>	Exclusion
African love grass*	<i>Eragrostis curvula</i>	Progressive containment
Banana passionfruit	<i>Passiflora tripartita var mollissima, P. tripartita var azuayensis, P. tarminiana*, P. pinnatistipula, Passiflora x rosea, P. caerulea</i>	Site-led
Bomarea*	<i>Bomarea caldasii B. multiflora</i>	Progressive containment
Boneseed*	<i>Chrysanthemoides monilifera</i>	Progressive containment
Broom (common and montpellier)	<i>Cytisus scoparius Teline monspessulana</i>	Sustained control
Bur daisy	<i>Calotis lappulacea</i>	Progressive containment
Cape ivy	<i>Senecio angulatus</i>	Progressive containment
Chilean flame creeper	<i>Tropaeolum speciosum</i>	Site-led
Chilean needle grass*	<i>Nassella neesiana</i>	Exclusion

Contorta (lodgepole) pine*	<i>Pinus contorta</i>	Progressive Containment
Corsican pine	<i>Pinus nigra</i>	Progressive Containment
Darwin's barberry*	<i>Berberis darwinii</i>	Site-led
False tamarisk	<i>Myricaria germanica</i>	Exclusion
Gorse	<i>Ulex europeus</i>	Sustained control
Lagarosiphon*	<i>Lagarosiphon major</i>	Site-led
Larch (excl. sterile hybrids)	<i>Larix decidua</i>	Progressive Containment
Moth plant*	<i>Araujia hortorum</i>	Exclusion
Mountain pine and dwarf mountain pine	<i>Pinus uncinata</i> <i>Pinus mugo</i>	Progressive Containment
Nassella tussock*	<i>Nassella trichotoma</i>	Progressive containment
Nodding thistle	<i>Carduus nutans</i>	Sustained control
Old man's beard*	<i>Clematis vitalba</i>	Progressive containment
Perennial nettle	<i>Urtica dioica</i>	Progressive containment
Ragwort	<i>Senecio jacobaea</i>	Sustained control
Scots pine	<i>Pinus sylvestris</i>	Progressive Containment

Spartina	<i>Spartina spp</i>	Progressive containment
Spiny broom	<i>Calicotome spinosa</i>	Eradication
Sycamore	<i>Acer pseudoplatanus</i>	Site-led
Gunnera	<i>Gunnera tinctoria</i>	Site-led
Tradescantia*	<i>Tradescantia fluminensis</i>	Site-led
White-edged nightshade*	<i>Solanum marginatum</i>	Progressive containment
Wilding conifers	See table 3 in the Pest Management Plan	Progressive containment
Wild Russell lupin	<i>Lupinus polyphyllus</i>	Sustained control
Animals		
Bennett's wallaby	<i>Macropus rufogriseus rufogriseus,</i>	Eradication
Feral cat	<i>Felis catus</i>	Site-led
Feral deer	<i>Cervus elaphus, C. nippon, C. dama</i>	Site-led
Feral goat	<i>Capra aegagrus hircus</i>	Site-led
Feral pig	<i>Sus scrofa</i>	Site-led
Feral rabbit	<i>Oryctolagus cuniculus</i>	Sustained control
Hedgehog	<i>Erinaceous europaeus</i>	Site-led
Mustelids (ferret, stoat, weasel)	<i>Mustelo furo, M. ermine, M. nivalis</i>	Site-led

Possum	<i>Trichosurus vulpecula</i>	Site-led
Rat (Norway, ship and Kiore)	<i>Rattus norvegicus, R. rattus R. exulans</i>	Site-led
Rook*	<i>Corvus frugilegus</i>	Eradication

* unwanted organisms

ORGANISMS OF INTEREST IN OTAGO

Common name	Scientific name
Plants	
Blackberry	<i>Rubus fruticosus</i>
Boxthorn	<i>Lycium ferocissimum</i>
Briar	<i>Rosa rubiginosa</i>
Buddleia	<i>Buddleja davidii</i>
Burdock	<i>Arctium minus</i>
Convolvulus	<i>Convolvulus arvensis</i>
Cotoneaster	<i>Cotoneaster spp.</i>
Cotton thistle	<i>Onopordum acanthium</i>
Egeria	<i>Egeria densa</i>
Giant hogweed	<i>Heracleum mantegazzianum</i>
Hawthorne	<i>Crataegus monogyna</i>
Hieracium (Hawkweed)	<i>Hieracium spp.</i>

Horehound	<i>Marrubium vulgare</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Lake snow	<i>Lindavia intermedia</i>
Periwinkle	<i>Vinca major</i>
Reed sweetgrass	<i>Glyceria maxima</i>
Rowan	<i>Sorbus aucuparia</i>
Saltmarsh rush	<i>Juncus geraldii</i>
Thyme	<i>Thymus vulgaris</i>
Wild ginger	<i>Hedychium gardnerianum</i>
Wild Thyme	<i>Thymus serpyllum</i>
Willow	<i>Salix</i> spp.

Animals

Goose Canada	<i>Branta canadensis</i>
White/domestic	<i>Anser</i> spp.
Mouse	<i>Mus musculus</i>
Wasp	<i>Vespula</i> spp.
Marine	
Asian paddle crab	<i>Charybdis japonica</i>

Mediterranean fanworm	<i>Sabella spallanzanii</i>
Sea squirts	<i>Styela clava</i> , <i>Eudistoma elongatum</i> , <i>Pyura doppelgangera</i> and <i>Didemnum vexillum</i>
Sea couch	<i>Agropyron pungens</i>
Undaria	<i>Undaria pinnatifida</i>

UNWANTED ORGANISMS

For a full list of unwanted organisms in New Zealand please visit the Ministry for Primary Industry's website:
<https://www.mpi.govt.nz/protection-and-response/finding-and-reporting-pests-and-diseases/registers-and-lists/>

APPENDIX 2: GUIDANCE FOR THE INCLUSION OF SITE-LED PROGRAMMES IN THE PEST MANAGEMENT PLAN

ORC may consider including an additional site-led programme or amend an existing site-led programme in the Pest Management Plan where this meets the requirements of the Biosecurity Act and results in positive benefits to the environment and people.

This appendix provides guidance for when a site-led programme may be included without the need to undertake a plan change to the Pest Management Plan:

- The area has significant value at a community, district, regional or national scale. For example:
 - Significant indigenous vegetation.
 - Significant habitats of indigenous fauna.
 - Outstanding natural character, features and landscapes.
- There is strong volunteer and/or community support for the programme, including from landowners who are willing to provide access to private property.
- The programme will result in environmental, social and/or cultural benefits.
- The programme meets the requirements of the Biosecurity Act 1993 and the National Policy Direction for Pest Management 2015.
- There is an agreement with the Otago Regional Council about:
 - How the site will be managed.

- How the programme will be delivered.
- The nature and level of support needed from ORC.
- The programme is resourced for its duration.



ACKNOWLEDGEMENT

ORC would like to sincerely thank the communities and stakeholders whose input has been invaluable in preparing the Biosecurity Strategy.

While the Biosecurity Strategy is a non-statutory document, ORC is committed to working collaboratively with stakeholders, groups, communities and individuals to implement the Strategy to achieve good biosecurity outcomes in Otago.

Photo source list

01: Northland Regional Council

02: DoC

03: DoC

04: Environment Southland

05: DoC

06: Environment Southland

07: Otago Peninsula Biodiversity Group

08: Otago Peninsula Biodiversity Group

09: Otago Peninsula Biodiversity Group



Meeting the requirements of the Biosecurity Act 1993 and National Policy Direction for Pest Management 2015: Analysis of costs and benefits

**Report prepared for Otago Regional Council as
part of the preparation of a Regional Pest
Management Plan**

October 2018

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Executive Summary

Approach

This report provides the information required for Otago Regional Council (ORC) to determine whether their options for management of pests in the region are likely to meet the requirements of the Biosecurity Act (1993) and the National Policy Direction for Pest Management (NPD). The report analyses four options for each pest based on the categories described in the NPD. These are:

- Sustained Control – where further spread onto uninfested areas is prevented, but the pest is allowed to increase in density on already infested areas.
- Progressive Containment – where the pest is reduced in extent and density and is contained within its existing infested area.
- Eradication – where the pest is removed from the region.
- Do Nothing – where the pest is allowed to continue to spread, and land holders undertake control as their own circumstances indicate.

The costs and benefits of each option are modelled using estimates of the pest's spread into new areas, rate of increase in density, the costs of control, and lost production. It also takes into account the costs of intervention in the form of inspection, monitoring and enforcement costs. The inspection, monitoring and enforcement costs are subject to change through the plan development process and are indicative only in this report. The net benefit is estimated over 100 years and is the difference between the costs and benefits of the proposed option and the costs and benefits that would be incurred if the region were not to intervene – i.e. the Do Nothing scenario. It should be noted that losses of production will occur from other causes in all scenarios, but the production losses included here are only those that are associated with the pest. This net benefit is then adjusted for the risk that the proposed objective will not be achieved to provide an estimate of the risk adjusted net benefit. Assumptions used in undertaking the modelling were provided by Otago Regional Council and are described in detail in the report and in Appendix A.

The results of the analysis of costs and benefits are summarised in Table 1. The table describes each proposed plan objective, the risk adjusted net benefit associated with that option, and the option which provides the highest risk adjusted net benefit.

However, the risk adjusted net benefit is based only on those costs that are quantified – these are the loss of production and the costs of control. Pests are also associated with a range of other impacts that cannot be reliably quantified in monetary terms, including those to mana whenua, biodiversity, recreation, and amenity values. For pests where the risk adjusted net benefit is positive, the proposed plan option is justified even without consideration of those items. Where the risk adjusted net benefit is negative it is important that these other impacts are taken into consideration.

Outcomes of analysis of costs and benefits

The outcomes of the analysis of costs and benefits is described below according to the plan option and outcome of the analysis.

Sustained Control pests with a positive net benefit - Rabbits, Broom, Gorse, Nodding thistle and Ragwort. These Sustained Control pests all produce a positive net benefit, although it is

important to remember that those pests which rely on boundary control have only a limited chance of achieving anything different from the Do Nothing option. In most cases the benefit accrues only on specific land types –hill and high country for rabbits, broom, gorse and nodding thistle, and dairy land for ragwort. The maximum net benefit can be achieved by constraining the plan to those areas, however a positive net benefit is still achieved region wide.

Progressive Containment pests with a positive quantified net benefit – African Love Grass, Bomorea, Bur Daisy, Cape Ivy, Old Man's Beard, Perennial nettle, and White Edged Nightshade all produce a positive net benefit taking into account production benefits and/or avoided costs of control in the future. Wilding conifers produces a positive net benefit, with the analysis including values for biodiversity benefit of \$23.75/ha/annum.

Progressive Containment pests with a negative quantified net benefit, but which may be positive with biodiversity benefits included – these include Boneseed and Spartina. If the council considers that the biodiversity benefits exceed \$370/ha for Boneseed and \$8360/ha for Spartina the benefits will exceed the costs. Sustained Control may have a higher net benefit for these pests depending on the considered risks of further spread under that approach.

Progressive Containment pests with a negative quantified net benefit, which may be more appropriately Sustained Control pests – Nassella tussock and Lagarosiphon. Nassella tussock produces a positive net benefit under Progressive Containment, but a higher net benefit under Sustained Control. Data in Canterbury shows that many years of intensive control effort made little progress in reducing the incidence of the pest.

Lagaroosiphon produces a negative net benefit under all options, but the cost of Sustained Control is substantially lower, and requires a biodiversity benefit of only \$19,000 per ha. Lagarosiphon is extremely difficult to control and reduce spread and preventing spread is in itself an ambitious objective. However the management of Lagarosiphon within Lake Wanaka and the Kawarau River, Lake Dunstan and Lake Wakatipu in accordance with Lagarosiphon Management Plans has been successful to date in controlling Lagarosiphon

The benefits and costs of Russell lupin have not been quantified because of a lack of data about the extent of the pest. The extent to which the benefits of the plan objectives for this pest exceed the costs will need to be assessed by decision makers.

Eradication pests – these include rooks, wallabies and spiny broom. The case for a positive net benefit is clear for rooks and spiny broom, but for wallabies it is only marginally better than Sustained Control. The justification for wallabies should be reviewed regularly to ensure Eradication is being achieved.

Exclusion pests – These are considered likely to be of net benefit because very little cost is involved and there are significant potential costs from establishment of the Exclusion pests in the region, which are known to have had impacts elsewhere.

The *Site led pest* programmes in Dunedin are considered likely to have a net benefit because they build on existing community initiatives and require land holder agreement, which suggests that the costs of control will be exceeded by the benefits to the parties involved.

Outcomes of funding analysis

The report also provides information on each of the items that must be considered in developing a funding policy for the pest management plan, and provides a recommendation on the funding options based on that information. The funding recommendations are provided

in the last five columns of Table 1 and should not be seen as definitive. The funding recommendations are divided into the programme related costs of inspection, monitoring and enforcement; and the cost of undertaking the control work. For cost of control the funding is divided into whether the funding is sourced from General Rate, a Targeted rate (generally on productive land), and /or from exacerbators in the form of contribution or requirement for control.

For pests that are solely production related - the funding recommendations are for a targeted rate on productive land for plan related costs, and generally landholder (exacerbator) control depending on efficiency of the measure.

For pests that are solely biodiversity related – the funding recommendations are for funding of inspection and monitoring costs from the General rate as the most efficient means of targeting the wider community as beneficiaries. Control costs are split between exacerbator control and funding from the general rate depending on the extent of the pest and the efficiencies associated with exacerbator control.

For the pests where there is both a productive and biodiversity related benefit - the costs of inspection, monitoring and control are apportioned between the General and Targeted rate depending on a qualitative assessment of the relative benefit to each party. They are not definitive and it is entirely appropriate that decision makers attach different weightings to various considerations to produce an alternative conclusion.

Good Neighbour Rules (GNR)

GNRs are proposed for feral rabbits, broom, gorse, nodding thistle, ragwort and wilding conifers as part of wider Sustained Control programmes for which the costs and benefits are assessed above. The relative reasonableness of the costs incurred between the occupier required to control and the neighbour otherwise affected must be considered under Section 7 of the NPD.

For rabbits - the difference in costs between the source and landholder affected depends on the proneness of the land involved. Requiring control of a boundary on land where the source is High land type or the receptor is low land type is not likely to be reasonable, but in other situations is likely to be reasonable.

For light infestations of nodding thistle, gorse, broom, and wilding conifers in hill and high country the costs incurred by occupiers who would be required to control under the GNR would be similar to the costs for the neighbour otherwise affected, although only on certain land types. A GNR for these situations would be reasonable.

For dense infestations of broom and gorse the costs for the party required to control are 50% higher than for the neighbour. In these situations a judgement needs to be made by the council as to whether the costs of compliance are reasonable.

For dense infestations of wilding conifers the costs of control for the party required to control are 8 – 9 times the costs for the neighbour, and boundary control is not likely to meet the tests of reasonableness in the NPD.

For ragwort the costs are likely to be reasonable where dairy properties are both the source and the affected parties. This conclusion is likely to hold for other land use types such as deer and beef which are susceptible to ragwort infestation. However where other land uses are involved that are not greatly affected by ragwort the costs are not likely to be reasonable.

For GNRs the council may choose to apply the rule to all land and provide exemptions (such as under Biosecurity Act for situations where the costs are not reasonable, or may choose to apply the rule only to situations where it is likely to be reasonable.

Table 1: Summary of cost benefit outcomes and funding recommendations.

Analytical outcomes						Funding of inspection and monitoring costs		Funding of control costs		
Pest	Proposed Objective	Risk Adjusted Net Benefit of Proposed Objective (NPV6% \$m)	Highest Value Plan Objective	Biodiversity or other benefits needed for plan to be positive (\$/ha NPV)	Biodiversity or benefits for Highest Value Plan objective (\$/ha NPV)	General Rate	Targeted rate on productive land	General Rate	Targeted rate on productive land	Land holder control or contribution
Exclusion Pests	Exclusion	Likely to be positive	Exclusion			100%		100%		
Bennetts Wallabies	Eradication	\$26 - \$97	Eradication	\$17.6		60%	40%	60%	40%	
Rooks	Eradication	\$0.36 - \$0.68	Eradication	-	-	100%		100%		
Spiny Broom	Eradication	\$12.8	Eradication			100%		100%		
African Love Grass	Progressive Containment	\$18.4	Progressive Containment			50%	50%	50% (non-productive land)	50% (non-productive land)	100% (productive land)
Bomorea	Progressive Containment	\$27.9	Progressive Containment			100%				100%
Boneseed	Progressive Containment	-\$0.43	Sustained Control	\$370/ha	\$120/ha	100%		100% (reduce prevalence)		100% (prevent spread)
Bur Daisy	Progressive Containment	\$1.7	Progressive Containment				100%		Some potential contribution	100%
Cape Ivy	Progressive Containment	\$4.9	Progressive Containment			100%		100% (large infestations on private land)		100%
Lagarosiphon	Progressive Containment	-\$160	Sustained Control	\$31,000	19,000	100%		100%		LINZ for control work.
Nassella Tussock	Progressive Containment	\$112	Sustained Control				100%			100%
Old Mans Beard	Progressive Containment	\$10.2	Progressive Containment			100%		100% (large infestations on private land)		100%
Perennial Nettle	Progressive Containment	\$8.3	Progressive Containment				100%			100%
Spartina	Progressive Containment	-\$5.6	Sustained Control	\$8630	\$3270	100%		100%		
White-edged Nightshade	Progressive Containment	\$0.05	Progressive Containment			50%	50%			100%

Analytical outcomes						Funding of inspection and monitoring costs		Funding of control costs		
Pest	Proposed Objective	Risk Adjusted Net Benefit of Proposed Objective (NPV6% \$m)	Highest Value Plan Objective	Biodiversity or other benefits needed for plan to be positive (\$/ha NPV)	Biodiversity or benefits for Highest Value Plan objective (\$/ha NPV)	General Rate	Targeted rate on productive land	General Rate	Targeted rate on productive land	Land holder control or contribution
Wilding Conifers	Progressive Containment	\$226	Progressive Containment	\$23.75/ha ¹	-	100%		100% Initial		100% Ongoing
Broom	Sustained Control	\$59.3	Sustained Control	-	-	50% biodiversity-	50% biodiversity, 100% productive	50% biodiversity		50% biodiversity, 100% to prevent spread
Gorse	Sustained Control	\$59.3	Sustained Control	-	-		100%			100%
Nodding Thistle	Sustained Control	\$1.6	Sustained Control	-	-		100%			100%
Rabbits (feral)	Sustained Control	\$149	Sustained Control		-	-	100%			100%
Ragwort	Sustained Control	\$76.5	Sustained Control				100%			100%
Site Led Pests	Site Led	Likely to be positive assuming community and land holder agreement	Site Led			100%		To be determined	To be determined	To be determined

¹ Assume a biodiversity benefit of \$23.75/ha/annum based on a willingness to pay survey (Kerr, et al., 2007).

1 Background

Otago Regional Council is reviewing its Regional Pest Management Plan (RPMP) to bring it in line with the requirements of the National Policy Direction (2015) (NPD). The NPD specifies a number of potential outcomes which are:

- Exclusion (Exclusion Programme)
- Eradication (Eradication Programme)
- Progressive Containment (Progressive Containment Programme)
- Sustained Control (Sustained Control Programme).
- Protecting values in places (Site led pest programme).

Section 6 of the NPD also specifies the requirements for analysing costs and benefits of the RPMP. Section 6 has 5 requirements:

1. Considerations to determine the level of analysis.
2. Requirements for undertaking the analysis of costs and benefits
3. Considerations for assessing the risks that the plan will not meet its objectives.
4. Requirements for taking into account risks that the plan will not meet its objectives.
5. Requirements for documentation of the analysis and the underlying assumptions.

The NPD also sets out how an assessment of the allocation of costs for the plan is to be undertaken in Section 7. This has two sections:

1. Considerations in grouping for the purposes of cost allocation.
2. Requirements in determining the appropriate cost allocation.

As with Section 6 on the analysis of costs and benefits, there is a requirement to document the analysis and underlying assumptions.

Ministry for Primary Industry (MPI) has also released guidance notes to accompany the NPD (NPD Guidance).

The analysis undertaken here follows the requirements of the NPD for each of the pests to be assessed. Otago Regional Council has categorised its pests into the new plan types, and has developed approaches to meet the desired objectives. It has also categorised the pests according to the requirements of Section 6(1) to determine the level of analysis that needs to be undertaken using the guidance material provided by MPI. This indicates that all pests in the RPMP are either low or medium in terms of the level of analysis required with the exception of Wilding Conifers which require a high level of analysis.

The sections that follow set out the analysis undertaken and results of the analysis in a format that responds to the requirement of the NPD and provides analysis of the potential funding arrangements for each pest.

The analysis is undertaken in two parts. For plant pests a generic model was applied to all pests as described in Section 5, with assumptions varied by pest. For animal pests separate

modelling was undertaken for each pest, with the method for each of the animal pests described within the section.

2 Rabbits (Feral)

2.1 Description

Rabbits were first released in the 1800s and soon became a significant agricultural pest as well as affecting native tussock ecosystems. Mustelids and cats were brought in an attempt to control rabbits but had little impact on rabbits but significant impact on native birdlife and other fauna. Rabbits survive best in dry and semi-arid environments, where although their reproduction rate is lower than in more productive agricultural environments, mortality is significantly lower.

Rabbits have a life span of up to seven years but there are high rates of mortality among young animals. Female rabbits can be pregnant for 70% of a year and a single adult doe can produce 20 – 50 young.

The introduction of Rabbit Haemorrhagic Disease (RHD) in 1997 significantly reduced rabbit numbers to the point where they were no longer considered a significant problem but there is evidence that RHD is losing its effectiveness in some situations. There has recently been a release of a new strain of the calicivirus that causes RHD, and it is expected that this will suppress rabbit numbers in areas where resistance to the original strain is present.

2.2 Proposed Plan

The proposed programme for rabbits is for Sustained Control, with a requirement that rabbits to be maintained at or below Maclean's Scale 3.

2.3 Method for analysis of Rabbit options

The analysis undertaken here is Level 2 analysis under the NPD, and is based on information provided by ORC on the costs experienced in managing rabbits. This section details the background assumptions, the model used, the results, and the significance of the results.

ORC differentiates between different land types in determining rabbit proneness and costs of control. The three categories used are High country, Medium country and Low country. There are shown in Table 2 below.

Table 2: Area in each rabbit proneness class for Otago (ha)

Low	Moderate	High
200,000	400,000	800,000

In order to determine the costs of spillover, an estimate was made of the likely impact on costs from rabbits moving between properties. This requires assumptions regarding the increase in control costs, the amount of area on a property likely to be affected by these increased control costs, and the proportion of land holders not controlling rabbits.

The costs of control with spillover between properties is likely to be higher because the immigration from neighbouring high populations densities will shorten the interval between control operations, and potentially increase the cost of those operations. The figures for Otago region were supplied by ORC and are shown in Table 3 below.

Table 3: Estimate of annual costs of control by rabbit proneness class

Land type	Total Operation cost/ha	Annual cost/ha without spillover	Annual cost/ha with spillover	Increase in cost/ha/year from spillover
Low	\$120.00	\$15.00	\$30.00	\$15.00
Moderate	\$180.00	\$30.00	\$60.00	\$30.00
High	\$250.00	\$50.00	\$150.00	\$100.00

The spread model assumes that increased costs of control as a result of spillover occur within 500m of a boundary. The boundary length affected is calculated using an assumed square shape for the property, which results in the smallest average boundary length and therefore is likely to be the most conservative.

The numbers of properties not controlling is estimated at 5%. At the height of rabbit infestations prior to RHD introduction non-control of rabbits reached as high as 70% in very rabbit prone parts of the country. However, it is expected that with better returns from high country farming, a better equity position, and the presence of a new strain of RHD, more control will be undertaken now than was the case at that time. While it is possible to produce an extreme case where 50% of the land holders do not control rabbits, a lower limit is used in this paper so that the results are conservative with respect to the benefit which land holders gain from reducing spillover.

It is assumed that the properties not controlling are evenly distributed among those controlling, which produces a higher cost to spillover than if they were to all clump together.

Production benefits are derived on a stock unit basis from MPI Monitoring Farm data for 2011/12² updated using Statistics NZ producer price index series. These stocking rates and returns are shown in Table 4

Table 4: Stocking rates and returns per stock unit for rabbit prone land

Land type	Low	Moderate	High	Gross margin returns per su (\$)
Otago Dry Hill	3	3	3	\$100.96

Inspection and monitoring costs are estimated by ORC at \$825,000 per annum, which is based on targeted monitoring on known prone properties.

2.4 NPD Section 6 Assessment

2.4.1 Level of analysis

The Sustained Control objective for rabbits is considered to require a medium level of analysis. This assessment is provided in Appendix B.

² <https://www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/agriculture/>.

2.4.2 Impacts of Rabbits (Feral)

Rabbits (*Oryctolagus cuniculus*) cause damage to pastoral agriculture through reduced pasture quality and animal intake. There are also potential damages to biodiversity associated with high rabbit because they browse on vulnerable native plant communities, and as prey they support the mammalian predators of native birds and animals.

Rabbits also provide some benefits associated with commercial hunting for meat and recreational hunting.

2.4.3 Options for response

Two options for a Sustained Control response are considered:

- Boundary control, where rabbits must be kept below Maclean's Scale 3 within 500m of a boundary where the neighbour is controlling rabbits.
- Full control, where rabbits are required to be kept under Maclean's Scale 3 throughout rabbit prone areas.

It is assumed that control is only undertaken on prone parts of Otago.

2.5 Risks of Rabbits (Feral) Plan

Technical and operational risks: Operational risks with failure of poisoning operations are known, particularly with repeated control efforts in high population densities causing neophobia (bait avoidance). These risks are lower with the presence of RHD, and regular poisoning operations are less common.

Implementation and compliance: There is a some of non-compliance in areas with high rabbit population numbers in rabbit prone areas, particularly given the relatively low return from grazing in very rabbit prone areas. This will be mitigated by the use of complaints and regular inspection of known prone locations to identify problem areas.

Other legislative risks: Risks arise to the availability of poisons through the Hazardous Substances and New Organisms (HSNO) Act.

Public or political concerns: The use of 1080 to is considered controversial and may attract opposition.

Other risks: None known

Summary: There are risks associated with the rabbit plan although these are likely to be reasonably low as long as RHD has a reasonable level of effectiveness and returns for high country sheep and beef remain at a reasonable level.

2.5.1 Net Benefit and Risk Adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan. These are shown in Table 5 below. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity. There are also intergenerational implications that should be taken into account.

The analysis shows that at 100% probability of success the Boundary Control option generates a net benefit of \$124 million (NPV(6%)), compared with \$149 million (NPV(6%)) for the Full Control plan that requires control on all rabbit infested land. The sensitivity analysis (Table 6)

shows that the results are reasonably robust to the assumptions made about discount rate and proportion controlling.

In order for the options to be worthwhile there would need to be a greater than 45% for Boundary Control option and 35% for the Full Control option. There are also potentially biodiversity benefits on 30,000 ha for the Boundary Control option, and 40,000 ha for the Full Control option.

The analysis suggests that the Full Control has the highest net benefit of the options considered for those values quantified, and protects a greater area from damage to biodiversity values.

Table 5: Outcomes of analysis of costs and benefits for Rabbits (Feral) (NPV6%)

Scenario Option	Control Costs (\$m)	Production loss (\$m)	Inspection, monitoring and enforcement (\$m)	Total (\$m)	Net Benefit of plan option (\$m)	Probability of success for plan to still be positive
Do Nothing	\$37	\$191	\$0	\$228	\$0	
Boundary Control	\$54	\$36	\$13	\$104	\$124	45%
Full Control	\$66	\$0	\$13	\$79	\$149	35%

Table 6: Assessment of sensitivity of results to assumptions for Rabbits (Feral) (NPV(6%) \$million)

	Discount rate			Proportion not controlling		
	6%	4%	8%	Base	2X	4X
Do Nothing						
Boundary Control	\$124	\$170	\$97	\$124	\$262	\$536
Full Control	\$149	\$203	\$116	\$149	\$311	\$635

NPD Section 7 - Allocation of Costs and Benefits

2.5.2 Beneficiaries, exacerbators and costs of proposed plan for control of Rabbits (Feral)

The beneficiaries and exacerbators of the plan are:

- **Beneficiaries:** The beneficiaries of the plan are land holders with high rabbit populations (production benefits), neighbouring land holders from the prevention of spread, and the wider community from prevention of damage to biodiversity, and prevention of soil erosion.
- **Active exacerbators:** Any persons transporting Rabbits (Feral) into or around the region

- Passive exacerbators: Any persons with Rabbits (Feral) on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 7. The benefits and costs of the plan options, and the parties to whom they accrue, are shown in Table 8. They show that control costs for land holders are the largest cost for both the Boundary and the Full Control approaches. There are potentially some indirect costs for commercial and recreational hunting from the Full Control plan that have not been assessed here. There are however significant benefits for the exacerbators in both the Boundary and Full Control approaches.

Table 7: Direct and indirect costs of plan for Rabbits (Feral) (\$ million PV6%)

Plan option	Control costs on land holders	Inspection and monitoring costs
Boundary Control	\$54.32	\$13.00
Full Control	\$66.20	\$13.00

Table 8: Benefits and costs of plan for Rabbits (Feral) that accrue to different beneficiaries and exacerbators (\$ million PV(6%))

	Plan option	Those currently infested	Those experiencing spillover costs
Benefits	Boundary Control	\$154.54	\$37.16
	Full Control	\$190.96	\$37.16
Costs for exacerbators	Boundary Control	\$54.32	\$0.00
	Full Control	\$66.20	\$0.00

2.5.3 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD and the analysis for each of these matters is shown in Table 4 below.

Table 4: Matters for consideration in allocating costs for proposed Rabbits (Feral) plan

Legislative rights and responsibilities	None known.
Management objectives	Sustained Control.
Stage of infestation	Widespread but only a problem in some areas.
Most effective control agents	Land holders are the most effective agents to undertake control at low levels, since this ensures that management of the land is aimed at reducing rabbit proneness. At high levels specialist skills are required to undertake aerial or ground poisoning operations.
Urgency	Low because populations appear generally stable and rabbits are very widespread.
Efficiency and effectiveness	It is most efficient to require land holders to control since this will encourage management of the land to reduce population densities. Inspection and enforcement costs are most efficiently targeted at beneficiaries, which are neighbouring properties for the prevention of spillover, and the wider community from biodiversity and soil erosion benefits.
Practicality of targeting beneficiaries	Beneficiaries from production gains are able to be targeted through a rate based on rabbit proneness or geographical area. Wider community beneficiaries are able to be targeted through General Rate.
Practicality of targeting exacerbators	Rabbit numbers can be established through inspection and land holders can be targeted. Exacerbators can therefore be readily targeted.
Administrative efficiency	The administrative efficiency of a targeted rate based on rabbit proneness will be low, and a geographically based rate on pastoral properties (area based e.g. rural zones) is likely to be most efficient for targeting the production beneficiaries from preventing spillover. The wider benefits can be most appropriately targeted through the General Rate.
Security	Rating mechanisms are generally secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement.
Reasonable	The costs of the programme are reasonably high and ongoing for some land holders. However, some immediate benefit is received in terms of saved production losses.
Parties bearing indirect costs	No indirect costs are expected.
Transitional cost allocation arrangements	Programmes for rabbit control have been in place over a long period. There are no specific problems likely to be encountered requiring transitional arrangements.
Mechanisms available	General Rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer. User charges are appropriate for costs of control.

2.5.4 Proposed allocation of costs

The control costs are appropriately targeted at exacerbators since they are able to be targeted, and by requiring them to undertake control there is likely to be greater efficiency in control of the rabbit populations.

The inspection, monitoring, and control costs are likely to be significant, but in both options they are less than the spillover costs avoided from uncontrolled rabbits on a boundary. Therefore the majority of the costs should be charged to land holders in the prone areas.

- Inspection and monitoring costs: 100% targeted rate for rabbit prone areas where inspection will occur.
- Control costs: 100% land holder control.

3 Bennett's Wallabies.

3.1 Description

Bennett's Wallabies were liberated in the Hunter's Hills in 1874 and became widespread over a reasonably large area of South Canterbury (350,000 ha) bounded by the Waimate river to the South, the Main divide to the west and north, and lack of suitable habitat to the East and North. The species present here is Bennett's Wallabies (*Macropus rufrogriseus rufrogriseus*). Surveys in the late 1940's indicated that wallabies had reached levels as high as 14/ha in suitable habitat.

Control of Bennett's Wallabies began in 1947 under the Department of Internal Affairs with a shooting programme, although little effect on population numbers was recorded. Aerial 1080 poisoning was carried out on the Eastern Hunter Hills between 1961 and 1963, resulting in a marked decrease in wallaby numbers. Until the Canterbury Regional Council took over responsibility for control of wallabies the South Canterbury Wallaby Board conducted gun and dog control with the occasional poisoning operation. The gun and dog control ceased in 1992 when local ratepayers refused to support the costs of service delivery. Since that time landholder control has been required, but the spread of wallabies has increased significantly such that they are now established on the south side of the Waitaki river in low numbers.

3.2 Impacts of Wallabies

Wallabies cause losses in agricultural production from competition with sheep and some prevention of isolated damage to fodder crops, and impacts to young forestry seedlings during establishment (Warburton 1986³).

There are also potential impacts to biodiversity and other ecosystem services. Warburton et al (1995) surveyed different vegetation types in the wallaby endemic areas. They concluded that wallabies do affect the sustainability and biodiversity of vegetation communities in the Hunters Hills. The observed effects were localised (1 - 5 ha), and were mainly significant in the tall tussock grasslands where browsing damage could be considerable. Plant species were browsed to extinction or severely hedged, and short matted turf and moss appeared in place of clumped tussock and mountain daisies in these pockets. In the short tussock grasslands wallabies have little effect, and in forest areas the effects of wallabies may be significant but were not readily distinguishable from those of other browsing herbivores such as sheep, goats, cattle, possums and deer. Adverse effects on soil and water were minimal and confined to

³ Warburton, B. 1986: Wallabies in New Zealand: history, current status, research, and management need. FRI Bulletin 114. Forest Research Institute, Christchurch. 29 p.

areas of high density and in their current state were readily reversed. Latham et al (2016⁴) undertook a wide review of literature related to wallaby impacts and the identified benefits associated with wallaby control, including ecosystem services associated with erosion control and sediment retention, and cultural services (i.e. aesthetic, educational, and scientific opportunities provided by ecosystems such as native tussock, scrub and forest).

Wallabies provide a quarry for recreational hunters in other areas, but this is unlikely to be the case in Otago because numbers are too low.

3.3 Proposed plan

ORC are proposing an Eradication programme for Wallabies with the aim of removing them from within the Otago region.

3.4 Method

The analysis undertaken here is Level 2 under the NPD, and relies on Latham *et al.* (2016) to estimate the annual costs and benefits of wallaby control under the Do Nothing scenario – ie their spread if no intervention was undertaken. The Latham, et al. data is converted to a NPV(6%) figure using a linear interpolation of wallaby population impacts from their current estimate to that in 2065. A full list of assumptions is shown in Table 9, Table 10, and Table 11.

The Latham *et al.* (2016) estimates are dependent on the assumptions made about the current range. Some assumptions are needed because no comprehensive survey of wallaby presence has been undertaken in large parts of Canterbury and Otago, and there have been known releases by hunters of wallabies into new areas. For the purposes of this analysis three different distributions and associated rates of spread are used as shown in Table 9. These are the known distribution of 5322 km², the probable distribution of 14,135km², and the probable distribution including illegal liberations. Because the rates of spread were estimated based on the changes from 1975 – 2015 the different assumptions about 2015 distributions produce three associated rates of spread. These are referred to as follows:

- Spread rate Low: based on known distribution in 2015;
- Spread rate Medium: based on probable distribution in 2015; and
- Spread rate High: based on probable distribution with illegal liberations occurring.

Using the assumptions in Latham et al (2016) lost production from wallaby infestation is based on an assumption about the stocking rate of wallabies and a conversion between wallaby numbers and sheep stock units of 3.8. That is for every 3.8 wallabies there will be 1 sheep stock unit (su) displaced. Stocking rates for wallabies are assumed to be 0.15/ha on flat country and 2 per ha on hill and high country. Density post control is estimated at 0.15 wallabies/ha on flat land and 0.2 wallabies/ha on hill and high country.

Losses associated with displaced stock units are based on the last five year's data for sheep and beef properties based on Beef and Lamb NZ Economic Survey data. The three classes used are Class 6 for flat land, Class 2 for hill country, and Class 1 for high country. The loss is estimated as a gross margin/ha which is the reduced revenue less the variable working

⁴ Latham, A.D.M., Latham, M.C., and Warburton, B. 2016. Review of current and future predicted distributions and impacts of Bennett's and dama wallabies in mainland New Zealand and . land care contract research report prepared for MPI. MPI Technical Paper No: 2016/15 March 2016.

expenses. The gross margin/ha is estimated at \$76/su for flat country, \$52/ha for hill country, and \$47/ha for high country.

Control costs are also taken from the Latham et al (2016) report. These are estimated at \$15.50/ha across all land uses including inspection costs. For the buffer area these are estimated at \$26/ha including inspection costs. The inspection costs are estimated at \$1/ha for the buffer zone and half that for extensive control in typical infested areas. The buffer area control is estimated based on the change in area infested when wallabies have spread 5km, with the buffer area differing across the three scenarios. This assumes 181.7m/year spread for Known, 827.8m/year for both Probable, and Probable with illegal liberation.

If control is undertaken inside the currently infested area in addition to the maintenance of a buffer zone, control costs in the buffer are assumed to be 1/10th of the cost if there were not control inside the containment area, because the number of wallabies spilling over into the buffer zone should be very small. However inspection costs are maintained at \$1/ha, although these costs should be seen as indicative and are subject to change through the planning process.

In the absence of intervention by the Council it is likely that a proportion of land holders will undertake control on their own behalf. The analysis assumes that 50% of land holders undertake control and adjusts the losses and control costs accordingly for the Do Nothing and Buffer scenarios.

Biodiversity costs are estimated at \$17.6/ha after Latham et al (2016) and Patterson & Cole (2013).

A discount rate of 6% is used for the analysis, although this is sensitivity tested at 4% and 8% (see Section 5.4).

Table 9: Predicted distributions (km²) of Bennett's Wallabies at five time periods using four different estimates of rate of spread (RS, in m/yr) and three different current range polygons. (Latham et al. 2016)

Year	Spread rate Low	Spread rate Medium	Spread rate High
2015	667.18	667.18	667.18
2020	844.15	1119.26	2360.32
2025	1046.3	1638.77	3646.33
2035	1490.11	2649.56	6301.52
2065	2787.3	6874.12	12431.73

Table 10: Assumptions for production losses by land use type

	Flat	Hill	High
Stocking rate sheep	14	7.5	0.7
Stocking rate wallabies/ha	0.15	2	2
Conversion rate wallabies/su	3.8	3.8	3.8
Gross margin/su	\$75.87	\$52.44	\$46.73
Net loss/ha	\$2.99	\$27.60	\$24.59
Ecosystem benefit (\$/ha)	\$17.6	\$17.6	\$17.6
Post control wallaby stocking rate (su/ha)	0.2	0.2	0.2
Post control production losses (\$/ha)	\$3.0	\$2.8	\$2.5

Table 11: Assumptions for control costs by scenario

	Item
Control cost/ha Current	\$15.5
Control costs/ha delayed	\$15.5
Control costs buffer	\$26
Control costs in absence of plan	\$15
5km buffer area (km ²)	556

3.5 NPD Section 6 Assessment

3.5.1 Level of Analysis

The Wallaby plan has been assessed as requiring a medium level of analysis. The assessment is provided in the table in Appendix B.

3.5.2 Impacts of Wallabies

Bennett's Wallaby causes loss of production from pastoral agriculture and crops. They also have impacts on biodiversity in tussock landscapes, scrub and forested areas. Wallabies provide recreational benefits for hunting.

3.5.3 Options for response

The analysis considers five options for Bennett's Wallabies:

1. Do Nothing
2. Sustained Control at current infestation levels
3. Sustained Control delayed 10 years

4. Eradication
5. Sustained Control with Buffer zone

3.5.4 Benefits and costs of options for management of Bennett's Wallabies

The benefits and costs of the five options for management of Bennett's Wallabies are shown in Table 12 for each of the three scenarios of current infestation and rates of spread. The analysis shows that in the absence of a plan (Do Nothing) there will be a loss in production of between \$100 million and \$380 million, control costs for land holders who do undertake control of between \$60 million and \$220 million, and a loss in biodiversity values of between \$30 million and \$750 million (all PV(6%).

Table 12: Impacts of options for management of Bennet's Wallabies

Plan	Impact	Spread rate Low (\$million PV(6%))	Spread rate Medium (\$million PV(6%))	Spread rate High (\$million PV(6%))
Do Nothing	Lost production without control	\$21.12	\$38.59	\$81.46
	Control costs	\$12.27	\$22.46	\$47.43
	Lost biodiversity without control	\$48.16	\$60.70	\$128.18
	Total	\$81.55	\$121.75	\$257.07
Sustained Control	Lost production with control	\$4.17	\$7.64	\$16.12
	Control at current	\$16.30	\$16.30	\$16.30
	Total	\$20.47	\$23.94	\$32.42
Sustained Control delayed 10 years	Lost production	\$9.43	\$14.03	\$27.91
	Lost biodiversity	\$7.04	\$6.47	\$12.90
	Control	\$18.03	\$27.64	\$60.48
	Total	\$34.50	\$48.15	\$101.28
Eradication	Lost production	\$0.00	\$0.00	\$0.00
	Cost of control inside buffer	\$15.36	\$15.36	\$15.36
	Lost biodiversity	\$0.00	\$0.00	\$0.00
	Control costs for buffer	\$0.00	\$0.00	\$0.00
	Total	\$15.36	\$15.36	\$15.36
Sustained Control with Buffer zone	Lost production	\$11.67	\$14.17	\$25.41
	Cost of control inside buffer	\$16.30	\$16.30	\$16.30
	Lost biodiversity	\$13.70	\$11.43	\$20.50
	Control costs for buffer	\$3.07	\$3.07	\$3.07
	Total	\$21.12	\$38.59	\$81.46

3.5.5 Risk Assessment

Technical and operational risks: Containment is difficult to achieve under the current regime because of a lack of co-ordinated control and the mobile nature of wallabies. Therefore, there is a risk that a Sustained Control plan which focused on either the currently infested area, or on the boundaries of the currently infested area, would be unsuccessful in containing the pest in its current area.

Implementation and compliance: There is potential for non-compliance by land holders due to the cost of control. While this will be somewhat mitigated by the inspection and compliance regime, and minor breaches are unlikely to affect the achievement of the containment plan overall, it appears that to date the current regime has not been successful in achieving widespread compliance. There is significant potential for the spread of wallabies by the hunting community which is difficult to prevent because those responsible cannot be identified. An ongoing surveillance regime outside the current infested area will be required.

Other legislative risks: Risks arise to the availability of poisons through the HSNO Act. There are also RMA requirements to be met in relation to poisoning operations.

Public or political concerns: Wallabies are high value for hunting activities, which may create pressures against the plan. There are also public concerns relating to the widespread use of poisons which may cause risks for the programme.

Other risks: Continued infestation of wallabies from Canterbury region.

3.5.6 Net benefit and risk adjustment

Table 13 shows the Net Benefit of each of the plan intervention options when compared with the Do Nothing scenario. This table shows that all intervention options produce a positive net benefit relative to the Do Nothing scenario. The Eradication scenario, where control is undertaken across the known infestation area, produces the highest net benefit under the all scenarios. The analysis suggests that if Sustained Control were to be undertaken, it would be worth delaying until it was implemented, although it should be noted that this is based on relatively slow rates of spread and limited area currently infested, so may not work out in practice.

When the options are adjusted for the assessment of risk Eradication still produces the highest net benefit, although this is based on the assumption that the significantly higher spend on inspection and monitoring in the Eradication option reduces the risk of non-achievement to similar to the other options. Note that this assumes 30 years of ongoing spend to achieve Eradication, which is a reasonably conservative assumption. When the Buffer Zone is included alongside control in the current area this option produces a higher net benefit than Sustained Control at higher rates of spread, which may in fact be encountered.

It is likely therefore that when adjusted for risk the Eradication option has the highest net benefit for managing wallabies in the Otago region.

Table 13: Net Benefit for management intervention options (\$ million NPV(6%))

	Spread rate Low (\$million PV(6%))	Spread rate Medium (\$million PV(6%))	Spread rate High (\$million PV(6%))
Sustained Control	\$61	\$98	\$225
Sustained Control delayed 10 Years	\$47	\$74	\$156
Eradication	\$66	\$106	\$242
Sustained Control with Buffer zone	\$37	\$77	\$192

Table 14: Risk Adjusted Net Benefit for management intervention options (\$million NPV(6%))

	Spread rate Low (\$million PV(6%))	Spread rate Medium (\$million PV(6%))	Spread rate High (\$million PV(6%))
Sustained Control	\$24	\$39	\$90
Sustained Control delayed 10 Years	\$19	\$29	\$62
Eradication	\$26	\$43	\$97
Sustained Control with Buffer zone	\$18	\$38	\$96

3.6 NPD Section 7 - Allocation of Costs and Benefits

3.6.1 Beneficiaries, exacerbators and costs of proposed plan for control of Bennett's Wallaby

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Pastoral agriculture, some crop adjacent to high density areas, general public from biodiversity benefits.
- Active exacerbators: Persons who release wallabies into new areas for hunting purposes.
- Passive exacerbators: Any persons with Bennett's Wallaby on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 15 and the size of the benefits and costs to different parties in relation to the plan options are shown in Table 16.

Table 15: Direct and indirect costs of plan for Bennett's Wallaby

Plan option	Control costs land holders (\$m PV(6%))	Inspection and monitoring costs (\$m PV(6%))
Sustained Control	\$3.50	\$0.53
Eradication	\$11.20	\$4.16
Sustained Control with Buffer zone	\$17.96	\$1.40

Table 16: Bennett's Wallaby programme benefits by beneficiary type and costs for exacerbators

	Plan option	Those currently infested (\$m PV(6%))	Those not currently infested (\$m PV(6%))	Community for biodiversity and ecological benefits (\$m PV(6%))
Benefits	Sustained Control	\$6.53	\$32.06	\$60.70
	Eradication	\$6.53	\$32.06	\$60.70
	Sustained Control with Buffer zone	\$6.53	\$32.06	\$60.70
Control costs for exacerbators	Sustained Control	\$16.30	\$0.00	\$0.00
	Eradication	\$15.36	\$0.00	\$0.00
	Sustained Control with Buffer zone	\$16.30	\$3.07	\$0.00

3.6.2 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 2 below.

Table 17: Matters for consideration in allocating costs for proposed Bennett's Wallaby plan

Legislative rights and responsibilities	None known.
Management objectives	Sustained Control.
Stage of infestation	Expanding – have expanded into Otago over the last decade since control effort was eased in Canterbury.
Most effective control agents	Wallabies are mobile and require targeting by hunters and poisoning. These are generally specialist skills.
Urgency	Moderate - spread is occurring but is relatively slow and limited to adjacent areas.
Efficiency and effectiveness	Efficiency and effectiveness maximised by focusing on removing wallabies from Otago and preventing further incursions.
Practicality of targeting beneficiaries	Beneficiaries are widespread throughout the region, although largely related to pastoral agriculture.
Practicality of targeting exacerbators	Bennetts wallabies are at low levels and it is difficult to directly identify their location. It is therefore difficult to target both passive exacerbators with wallabies on their property, and active exacerbators who move wallabies.
Administrative efficiency	General Rate is highly efficient for collecting community benefits related to biodiversity. Targeted rural rate is appropriate for benefits to pastoral agriculture.
Security	Rating mechanisms are generally secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement.
Reasonable	The costs of the programme are potentially high for some land holders in the containment areas with little benefit received.
Parties bearing indirect costs	Hunters experience some loss of value associated with reduced hunting opportunity.
Transitional cost allocation arrangements	Transitional cost arrangements may be required when controlling high levels of wallabies in the buffer zone areas because of the low level of benefits received by land holders.
Mechanisms available	General Rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

3.6.3 Proposed allocation of costs

Wallabies are at low numbers and very mobile It is therefore difficult to identify exacerbators and require control. It is also unlikely that eradication would be achieved with landholder control. Control effort is best funded from beneficiaries through rates rather than exacerbators from landholder control.

The benefits from the plan are approximately 60% to the wider community from prevention of damage to biodiversity values. The remainder of the benefit is to the wider rural community from prevention of damage to production values.

General Rate is most appropriate for the community benefit, and a targeted rate based on productive land in the region is most appropriate for the wider land holder benefits.

- Inspection, monitoring and control costs: 60% General Rate, 40% targeted rate on productive land.

4 Rooks

4.1 Description

Rooks (*Corvus frugilegus*) are native to Great Britain and Europe and were introduced to New Zealand in the 1860s to control insect pests. They are considered pests of farms because they cause losses primarily to crop production through eating of newly sown seed, and to a lesser extent from mature crops. There are also localised instances of severe damage to horticultural crops and there may be some damage to pasture from disturbance as rooks seek invertebrates in the soil. Rooks can form large breeding colonies, called rookeries, of several hundred birds.

Rooks have been under control for a long period in Otago. There are currently 3 areas where rooks occur, and an estimated population of 50 birds.

4.2 Proposed plan

ORC are proposing an Eradication plan for Rooks.

4.3 Level of analysis

The assessment of rooks is considered to require a Level 1 analysis under the guidelines of the NPD Guidance.

4.4 Method

Two models of linear population expansion are used, with maximum areal extent being reached in 25 or 50 years' time under each model. These are based on the area of productive land (1.4 million ha) and the lower figures uses an annual spread rate of 1.3 km/year, while the upper figure simply doubles this as a conservative estimate. These population growth scenarios may overestimate the rate of growth of an undisturbed population because in the 30 years following their introduction to Canterbury in 1870s the rooks appeared to inhabit only a limited number of sites in the central city. Rooks did not seem to migrate from their home rookery unless disturbed. Expansion rates under disturbance however, may amount to 1.3 to 1.6 km per year (Coleman 1995), and population increase rates of 20%/annum have been reported in Scotland and Hawke's Bay (NPCA, 2015). The range of times to occupy the region are likely to appropriately bracket the potential time spans for damage to occur. The increase in population densities will be too high for the initial years, and too low during the period of maximum expansion. However, for the purposes of this level of analysis the assumption is considered to be sufficient.

Maximum populations of uncontrolled rooks are taken from Coleman (1995) using the highest levels seen in Hawkes Bay in the 1960s of 5.2 adult birds per square kilometre. A factor of 50% was added to this for counting errors and non-breeding birds. This amounts to a maximum population of approximately 90,000 birds in Otago over 10,700 km².

The main source of rook damage is feeding on newly sown cereal and vegetable seed and young shoots. Legumes are not eaten as newly sown or young shoots but may be eaten as ripening pods. Rooks also feed on mature grain, and grain in stubble, but the financial cost of this is probably small or very localised. Rooks may also cause damage to pasture in their search for invertebrates, but this damage is not included in the analysis. They also provide some positive benefits by reducing populations of pest insect species.

The amount which rooks are likely to eat is estimated from Gromadzka (1980)⁵ at 13kg cereal and 16kg of animal matter annually. In a rook feeding study in Hawkes Bay, Purchas (1980) recorded a relatively small proportion of total feeding time spent in newly sown cereal fields. In autumn, spring, and early summer rooks spent 1 - 2% of their time in newly sown cereal fields. Critical periods for cereal crop growth in Canterbury will be May - June (autumn sown) and August - mid October (spring sown), a total of 20 weeks. The analysis uses figures of 1.5% per day for the time which rooks spend feeding on newly sown crops.

Because the rooks feed *en masse* and down rows it is assumed that they will strip the row relatively bare of seed so there will be negligible compensatory growth by surrounding crop plants. For this analysis the proportion of loss is equal to the amount eaten, with the impact of the seed eaten based on sowing rates from the Lincoln University Farm Technical Manual.

The areas of crops available for rook damage are taken from NZ Statistics Agricultural Census information for 2012. Crop loss per ha is assessed using the Gross Margin derived from the Beef and Lamb NZ farm economic survey, using the average of the last five years of their Class 8 (Mixed Cropping) model (\$897/ha). So if rooks eat 50% of the sown seed in a field, the gross margin is reduced by 50%. This is likely to underestimate the losses in some locations with heavy damage, as harvesting may not be economic.

Inspection and control costs are estimated by ORC at \$8000 for inspection, monitoring and control. These costs are subject to change through the planning process and are indicative only. It is assumed that the costs are only required for a further 10 or 20 years until Eradication can be deemed to have been achieved.

A discount rate of 6% is used for the analysis (see Section 5.4).

4.5 NPD Section 6 Assessment

4.5.1 Impacts of Rooks

Rooks feed on a range several kilometres around their roost and have a wide range of food in their diet. Losses are caused primarily to crop production through eating of newly sown seed and to a lesser extent from mature crops. There are also localised instances of severe damage to horticultural crops and there may be some damage to pasture from disturbance as rooks seek invertebrates in the soil. Individuals with rooks on their property may regard the roost as an attractive feature and Eradication of rooks causes a loss of this value.

4.5.2 Options for response

The analysis considers two options for Rooks:

⁵ Gromadzka, J. 1980. Food composition and food consumption of the Rook (*Corvus frugilegus*) in agrocoenoses in Pol and . Acta Ornithologica, Polish Academy of Sciences. 17:227:256

1. Do Nothing
2. Eradication

No other options are considered appropriate given the low level of rook populations currently.

4.5.3 Benefits and costs of options for management of Rooks

The benefits and costs of the two management options are shown in Table 18. This shows the net benefit of the plan relative to the Do Nothing, and suggests there is a positive net benefit under a range of assumptions about rate of spread and time to achieve Eradication

Table 18: Benefits and Costs of Rook Management options

Option		Losses for newly sown crops (PV)	Control costs (PV)	
			10 years	20 years
			Eradication achieved in:	
			10 years	20 years
Do Nothing	25 yrs to max	\$680,681		
	50 yrs to max	\$361,124		
Eradication		0	\$41,699	\$66,881

Table 19: Net Benefit of Eradication at two different rates of spread

Rate of spread	Eradication achieved in: (NPV(6%))	
	10 years	20 years
Linear - 25 yrs to max	\$638,982	\$613,800
Linear - 50 yrs to max	\$361,124	\$361,124

4.5.4 Risks of Rooks Plan

Technical and operational risks: It is difficult to ensure Eradication with a very small number of mobile birds. However, this risk is mitigated by the high expertise of staff in controlling rooks, and the likelihood that the three remaining birds are all male.

Implementation and compliance: Requires expertise to control rooks due to specialised techniques and their mobility. This risk is mitigated by the existence of those skills within the Council and contractors.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

The level of risk that the plan is not achieved for the plan to no longer be worthwhile is shown in Table 20. It shows that risks that the plan is not achieved would have to be a greater than

81% - 94% in order for the plan to no longer be worthwhile. Given the low levels of rooks, this level of risk is unlikely to be realised and the plan should be considered worthwhile.

Table 20: Maximum risk of non-achievement for benefits of the Rook plan to still outweigh the costs

Rate of spread	Eradication achieved in :	
	10 years	20 years
Linear - 25 yrs to max	94%	90%
Linear - 50 yrs to max	88%	81%

4.6 NPD Section 7 - Allocation of Costs and Benefits

4.6.1 Beneficiaries, exacerbators and costs of proposed plan for control of Rooks

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Arable farmers, pastoral farmers, general public.
- Active exacerbators: Any persons transporting Rooks into the region.
- Passive exacerbators: Any persons with Rooks on their property not undertaking control.

The direct costs of rook control are the inspection and control costs which are estimated at between \$40,000 and \$70,000 NPV(6%). There are also some indirect costs associated with reduced aesthetic benefits from rookeries.

The benefits of the plan accrue to all arable and pastoral land holders for avoided losses of between \$360,000 and \$680,000 NPV(6%). There are also some potential benefits to the wider community from the avoidance of impacts to biodiversity.

4.6.2 Matters for consideration in allocation of costs of Rook Plan

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 4 below.

Table 4: Matters for consideration in allocating costs for proposed Rooks plan

Legislative rights and responsibilities	None known.
Management objectives	Eradication.
Stage of infestation	Very low (50 individuals) following a long control programme.
Most effective control agents	Specialist rook control agents (contractors and Council staff) required.
Urgency	Very high in that if allowed to expand several decades of control effort will be wasted.
Efficiency and effectiveness	It is likely to be more efficient to eradicate than other options. Management and control by the Council is likely to be the most effective due to specialist skills required.
Practicality of targeting beneficiaries	Arable beneficiaries cannot be easily targeted at a regional level other than through a levy on arable products. This would be expensive and difficult for the small funding required. Wider beneficiaries can be targeted through General Rate.
Practicality of targeting exacerbators	Rooks are very mobile so difficult to target exacerbators.
Administrative efficiency	General Rate is highly efficient for small sums required and the difficulty of targeting the main beneficiaries.
Security	General Rate offers high security of funding for long term control effort required to achieve Eradication.
Fairness	The main beneficiaries are not targeted.
Reasonable	Given the small funding requirements and difficulty of alternative approaches the General Rate is a reasonable approach.
Parties bearing indirect costs	No indirect costs are expected.
Transitional cost allocation arrangements	Not required.
Mechanisms available	General Rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

4.6.3 Proposed allocation of costs

Because of the low level of costs, and the difficulty of targeting beneficiaries or exacerbators, it is recommended that the costs for Eradication of rooks be charged to the General Rate.

5 Method for Plant Pests

For plant pests a generic model was developed to assist in estimating the change in costs associated with a pest over time under the different management options. This model mathematically calculates the estimated impacts associated with pest management options, and has four components discussed below. Detailed assumptions used for each pest are included in a table in Appendix A.

5.1 Infested area

The infested area is determined by the area currently infested, the number of active sites, the rate of spread, and the generation of new sites which are user inputs. The area of the largest current site is user input, then it is assumed that the remaining sites are of equal size covering the remaining area. The area of each site is increased annually by the rate of spread on a quadrant basis. Each quadrant of an infested area keeps expanding until it reaches its nearest boundary then stops increasing in area. The distance from boundaries is user input but there is no assumption about the proximity of infestations to each other – i.e. the model assumes that the current infestations and new infestations are equidistant, and do not coalesce into a larger site until the area is fully occupied.

New sites are generated at a user input rate each year. This allows for the fact that mathematically the rate of increase in area of a larger number of sites is greater than for a single site expanding on its boundary.

Once the fully available area is occupied all infested areas cease expanding. It is assumed that pest spread will continue under the Do Nothing scenario regardless of land holder control, but that other plan options will have user input success in preventing spread depending on the option.

5.2 Density

The density of pests in an infested area increases in a logistic fashion according to the equation:

$$N_y = N_{y-1} + N_{y-1} * r * (1 - \frac{N_{y-1}}{D})$$

Where

N_y = density in year y

r = logistic growth constant

D = maximum density

The value for r is estimated from the period between first arrival at a site and full density, which is a user input estimate (sensitivity tested).

5.3 Losses

Losses arise from control costs and production loss, as well as from displaced biodiversity and impacts on other values. The model calculates production loss and control costs and uses area displaced as a proxy for the impact on other biodiversity, amenity, and recreation values.

It is assumed that once an area is infested control costs are required and that a proportion will undertake control, with the proportion under each plan option user input. The control costs are fixed on an area basis.

Production losses are assumed where control is not undertaken, with the loss proportional the area displaced. It is assumed that infested land where control is not undertaken is unable to be used for productive purposes, hence both revenue and variable costs are zero. The losses are greater than the straight operating profit/ha because fixed costs are still incurred by the operation. For each land use type, the losses equal the revenue/ha less the variable costs/ha. The revenue, costs and production losses used in the model are shown in Table 21. These are based on the five year's reported farm budgets to 2015/16 from DairyNZ⁶ and Beef and Lamb NZ Table 21.

Table 21: Estimated revenue, costs and production losses by land use type in pest model

Land use	Revenue (\$/ha/year)	Fixed Cost (\$/ha/year)	Variable Cost (\$/ha/year)	Reduction in operating profit/ha (\$/ha/year)
High country	\$105	\$35	\$49	\$56
Hill country	\$347	\$123	\$151	\$195
Intensive finishing breeding	\$1,065	\$375	\$438	\$627
Crop	\$3,041	\$1,405	\$1,263	\$1,778
Dairy	\$10,188	\$2,931	\$7,811	\$2,377
Intensive pasture	\$4,106	\$1,227	\$2,896	\$1,210
All intensive systems	\$3,948	\$1,253	\$2,654	\$1,294
All extensive pasture	\$245	\$86	\$108	\$137

5.4 Estimate of NPV

The analysis is collated into an annual cashflow for each management option for 100 years. These are then converted into a net present value at a discount rate of 6% (NPV(6%)). Sensitivity testing is undertaken for the r value, rate of spread, cost of control, gross margin for loss of production, and discount rate (4% and 8%).

Choice of discount rate is important and a higher rate favours investments with earlier returns or costs that are further in the future. The discount rate of 6% is chosen because it matches the NZ Treasury recommendation⁷. It is higher than the 4% used by the Auckland Regional Council, but because most of the quantified benefit is associated with agricultural losses and control costs for land holders the 6% better reflects their cost of capital. Decision makers should note the impact of the higher and lower discount rates in the sensitivity testing when determining the best course of action.

The risks that the option will not meet the objective were identified for each pest and mitigation options considered where appropriate. The residual risk associated with the different outcomes was estimated as a user input based on observation of success rates in similar

⁶ DairyNZ data for revenue and operating expenses at the Otago level is used, then adjusted using more detailed national data to estimate the proportion of fixed expenses.

⁷ <http://www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/currentdiscountrates>

programmes. The assumptions differ for each objective. For example if the objective is Eradication then there is a probability of achieving Eradication, but also a probability that some other outcome will be achieved – reduction, stable infestations, or continued expansion. The probabilities are assigned to each potential outcome such that the probabilities sum to 1. The risks for each plan option are assumed to be the same unless there is a reason why a particular pest is likely to differ from the standard assumptions for that objective type. The risk assumptions for each plan option are shown in Table 54 to Table 56.

In addition to this approach sensitivity tests were undertaken on the risk adjusted outcome for a range of variables. These show whether the highest rated option changes as different variables are changed and are presented as a table of the highest rated option for each sensitivity test.

5.5 Scenarios

The model tests four scenarios – one Do Nothing scenario, and three that relate to the three primary NPD objectives of Sustained Control, Progressive Containment, and Eradication. This approach allows the model to efficiently test a wide range of pests regardless of the proposed objective, and compares it with the other potential objectives for the plant. The descriptions for each of three scenarios are set out below.

Do Nothing – no control is required of land holders, and although land holders may individually undertake control, the lack of co-ordination means that the pest continues to spread. The majority of the model is focused on assessing impacts of the expected rate of spread and rate at which infested habitats are occupied. The outcomes for the Do Nothing scenario reflect the loss of production from land infested by the pest when control is not undertaken by landholders, and the costs of control where landholders do undertake control and don't incur production losses.

Sustained Control – In this scenario control is undertaken and the model assumes that because control is co-ordinated there is no further spread of the pest but also no reduction in its extent. The proportion of the land controlled is greater than in the Do Nothing scenario because the rules require land holder control under a range of circumstances with the proportion controlled generally high in pests with limited distribution (90%) but lower in widespread pests (30% - 50%). However, in the areas where control is not undertaken the pest continues to increase in density. Per ha costs of control are the same as for the Do Nothing scenario.

Progressive Containment– This scenario is essentially the same as the Sustained Control scenario but the control effort results in a reduction in the area of the pest affected. The reduction is estimated by the period over which area affected is reduced to 0 - 50 years for the pests of limited distribution, and 100 – 1000 years for more widespread pests. The proportion controlling is also assumed to be higher and is set at 95% for all pests. In areas not under control the pest continues to increase in density. Per ha costs of control are twice that of the Do Nothing scenario to reflect the fact that more careful control is required.

Eradication – This scenario assumes that all land is under control and no further increase in density or area is expected. It is assumed that Eradication can be achieved in 20 years for all pests of limited distribution and 50 years for more widespread pests. It is assumed that inspection and monitoring costs are 1.5 times that for Progressive Containment for all pests of limited distribution, and 2.5 times that of Progressive Containment for widespread pests.

Per ha control costs are assumed to be 5 times that of the Do Nothing scenario to reflect the fact that very high levels of control are required if Eradication is to be achieved.

The costs of inspection, monitoring and enforcement are varied by scenario for each pest to reflect the fact that these costs vary in both intensity and aggregate requirements depending on how widespread a pest is and how intensively it is being managed. Thus where the objective is Eradication, significantly more intensive inspection is required than where the objective is Sustained Control. The ratio of inspection costs are given in relation to the costs for Sustained Control inspection, and are shown in Table 22 below. The inspection costs should be seen as indicative only and are subject to change through the planning process.

Table 22: Ratio of inspection costs by objective for each scenario considered (base Sustained Control = 1)

Pest	Ratio of inspection costs (Sustained Control = 1)	
	Progressive Containment/ Sustained Control	Eradication/ Sustained Control
Spiny Broom	4	6
African Feather Grass	4	6
Chilean Needle Grass	4	6
Moth Plant	2	3
African Love Grass	4	6
Boneseed	4	6
Bur Daisy	4	6
Cape Ivy	4	6
Nassella Tussock	20	50
Old Mans Beard	20	50
Perennial Nettle	4	6
Spartina	4	6
White-edged nightshade	4	6
Wilding conifers	4	6
Bomarea	4	6
Lagarosiphon	4	6
Broom	20	50
Gorse	20	50
Nodding Thistle	20	50
Ragwort	20	50

5.6 Net Benefit analysis

The net benefit is estimated over 100 years and is the difference between the costs and benefits of the proposed option and the costs and benefits that would be incurred if the region were not to intervene – i.e. the Do Nothing scenario. This is calculated by subtracting the alternative scenarios from the Do Nothing scenario, and if the result is positive it indicates that the overall losses caused by the pest are lower than in the alternative scenarios, and therefore the alternatives are preferred. This net benefit is then adjusted for the risk that the proposed objective will not be achieved to provide an estimate of the risk adjusted net benefit. Assumptions used in undertaking the modelling were provided by Otago Regional Council and are described in detail in the report and in Appendix A.

However, the risk adjusted net benefit is based only on those costs that are quantified – these are the loss of production and the costs of control. Pests are also associated with a range of other impacts that cannot be reliably quantified in monetary terms, including those to mana whenua, biodiversity, recreation, and amenity values. For pests where the risk adjusted net

benefit is positive, the proposed plan option is justified even without consideration of those items. Where the risk adjusted net benefit is negative it is important that these other impacts are taken into consideration.

The analysis therefore provides estimates of the threshold value that these other biodiversity, recreation, and amenity values would need to exceed in order for the plan objective to be positive. This threshold value is calculated by dividing any negative net benefit by the area protected by the proposed programme.

5.6.1 Caveats

The results generated from the plant pest model are based on a range of user inputs and assumptions about the behaviour of the pest. The best information available is used in generating these inputs, but the results should be treated as indicative of the likely outcomes under those conditions, and not definitive. They are intended as appropriate for the level of analysis required and the degree of information available rather than the most comprehensive CBA that could be undertaken for any given pest.

6 Spiny Broom

6.1 Description

Spiny Broom (*Calicotome spinosa*) is a spiny erect leguminous shrub. It prefers warm temperate conditions and dry acidic soils and moderate rainfall. As with common broom its seeds are ejected from pods during hot weather. Spiny broom can out-compete native plants and has an impact on native ecosystems, waterways, and agricultural land. It crowds out pasture and prevents grazing in dense patches.

6.2 Proposed Plan

ORC is proposing that Spiny Broom is controlled through the Eradication objective described in Section 1(b) of the NPD.

6.3 NPD Section 6 Assessment

6.3.1 Level of analysis

The assessed level of analysis for Spiny Broom under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

6.3.2 Impacts of Spiny Broom

Spiny Broom has the potential to cause loss of production from pastoral agriculture in hill and high country, and damage to biodiversity values.

6.3.3 Benefits for management of Spiny Broom

Prevention of loss of production from pastoral agriculture in hill and high country and prevention of damage to biodiversity values. Net benefits are NPV \$14,000,000 relative to the pest being kept at its current level. There is also the prevention of any impacts to biodiversity on an area of 34,330 ha after 100 years if the pest is allowed to spread.

6.3.4 Costs of Spiny Broom Plan

The plan will incur costs of control, inspection and monitoring. These are \$1500 annually for the plan option. Costs for all three options considered are NPV(6%) \$500 for Sustained Control, NPV(6%) \$9,000 for Progressive Containment, and NPV(6%) \$20,000 for Eradication (which has a shorter time frame).

6.3.5 Risks of Spiny Broom Plan

Technical and operational risks: Eradication is technically difficult to achieve, and requires consistent long term efforts.

Implementation and compliance: Work will be undertaken by ORC so implementation and compliance risks are low.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

6.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Eradication option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 34330 ha that should be taken into account.

These factors suggest that the Eradication option is strongly favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable.

Table 1: Outcomes of analysis of costs and benefits for Spiny Broom

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$13,690,000		
Eradication	\$50,000	\$13,650,000	\$12,790,000
Progressive Containment	\$20,000	\$13,670,000	\$12,140,000
Sustained Control	\$8,000	\$13,690,000	\$6,700,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Eradication
Time to full occupation 50% of base	Eradication
Time to full occupation 150% of base	Eradication
Distance of spread 50% of base	Eradication
Distance of spread 200% of base	Eradication
Cost of control +20% from base	Eradication
Cost of control -20% from base	Eradication
Loss of production impacts -20% from base	Eradication
Loss of production impacts +20% from base	Eradication
Discount rate 4%	Eradication
Discount rate 8%	Eradication

6.4 NPD Section 7 - Allocation of Costs and Benefits

6.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Spiny Broom

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits. Wider community from prevention of damage to biodiversity values.
- Active exacerbators: Any persons transporting Spiny Broom into or around the region
- Passive exacerbators: Any persons with Spiny Broom on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Spiny Broom

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$7,000	\$4,000
Progressive Containment	\$30,000	\$20,000
Eradication	\$50,000	\$20,000

Table 5: Benefits and costs of plan for Spiny Broom that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$-1,500	\$14,000,000	\$7,000
Progressive Containment	\$-21,000	\$14,000,000	\$30,000
Eradication	\$-44,000	\$14,000,000	\$50,000

6.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Spiny Broom plan

Legislative rights and responsibilities	None known
Management objectives	Eradication
Stage of infestation	Early infestation with only 3 sites in Otago.
Most effective control agents	Regional council agents will be most effective because control is required in a timely manner and all plants need to be removed.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values and the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Locations are limited and known, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for Bur Daisy for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

6.4.3 Proposed allocation of costs

Because of the low level of Spiny Broom, and the widespread benefits to both landholders and the community, a General Rate is the most appropriate source for funding the Eradication objective. This will also ensure security of funding and management of the control effort.

7 African Love Grass

7.1 Description

African Love Grass (*Eragrostis curvula*) is a clump forming perennial grass that grows up to 1.5m tall. It has fibrous roots up to 50cm deep and grows in a wide range of habitats. It grows in short and tall tussock grasslands, coastal areas, riverbeds, cliffs, and non-productive land. It displaces productive and native species, and has a limited distribution in 3 active sites in South Canterbury and Christchurch.

7.2 Proposed Plan

ORC is proposing that African Love Grass is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

7.3 NPD Section 6 Assessment

7.3.1 Level of analysis

The assessed level of analysis for African Love Grass under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

7.3.2 Impacts of African Love Grass

African Love Grass has the potential to cause loss of production from pastoral agriculture in hill and high country.

7.3.3 Benefits for management of African Love Grass

Prevention of loss of production from pastoral agriculture in hill and high country. Net benefits are NPV \$29 million relative to the pest being kept at its current level. There is also the prevention of any impacts to biodiversity on an area of 17,000 ha after 100 years if the pest is allowed to spread.

7.3.4 Costs of African Love Grass Plan

The plan will incur costs of control, inspection and monitoring. These are \$4500 annually for the plan option. Costs for all three options considered are a NPV of NPV \$20,000 for Sustained Control, NPV \$70,000 for Progressive Containment, and NPV \$80,000 for Eradication (which has a shorter time frame).

7.3.5 Risks of African Love Grass Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, and requires adaptation of management techniques by farmers.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

7.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Progressive Containment option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below and shows that apart from the lower discount rate test the conclusion that Progressive Containment has a higher net benefit than other options is reasonably robust to a range of changes. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 17140 h that should be taken into account.

These factors suggest that the Progressive Containment option is strongly favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable.

Table 1: Outcomes of analysis of costs and benefits for African Love Grass

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$29000000		
Eradication	\$100000	\$28520000	\$18,380,000
Progressive Containment	\$100000	\$28550000	\$18,430,000
Sustained Control	\$30000	\$28560000	\$17,100,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Eradication
Discount rate 8%	Progressive Containment

7.4 NPD Section 7 - Allocation of Costs and Benefits

7.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of African Love Grass

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits. Wider community from prevention of damage to biodiversity values.
- Active exacerbators: Any persons transporting African Love Grass into or around the region
- Passive exacerbators: Any persons with African Love Grass on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for African Love Grass

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$10000	\$20000
Progressive Containment	\$30000	\$70000
Eradication	\$60000	\$80000

Table 5: Benefits and costs of plan for African Love Grass that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$-404	\$29000000	\$10000
Progressive Containment	\$-14034	\$29000000	\$30000
Eradication	\$-39981	\$29000000	\$60000

7.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed African Love Grass plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Early infestation with only twenty sites in Otago.
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values and the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Locations are limited and know, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while generate rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for African Love Grass for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

7.4.3 Proposed allocation of costs

The benefits of control of African Love Grass are primarily to the rural community, although African Love Grass causes damage to both production values and biodiversity. It is therefore appropriate that both the wider community and rural land holders contribute to the plan. Because of the reasonably extensive nature of the pest, it is appropriate that exacerbators contribution is made in the form of land holder control on productive properties, with a mixture of General Rate and targeted rural rate contribution to any control on non-productive areas and public land, and for inspection, monitoring and control. The recommended regime is:

- Inspection and monitoring costs – 50% General Rate, 50% rural targeted rate
- Control on non productive areas and public land – 50% General Rate, 50% rural targeted rate
- Control on productive land – land holder control.

8 Boneseed

8.1 Description

Boneseed (*Chrysanthemoides monolifera ssp monolifera*) is a shrub type weed typically reaching 1.3 to 1.5m in its native area of South Africa. The leaves are thick and leathery and palatable to stock. Boneseed occurs in coastal habitats throughout the North Island and in many parts of the South Island in more limited distribution. Boneseed occupies coastal cliffs, sand dunes, gardens, shrub land, and non-productive places. It has been thought that its inland spread is limited by frost, but studies in South Africa and Australia indicate that it may be frost tolerant and that this may not be a limiting factor.

Boneseed can grow on a variety of soil types although most infestations occur on sandy or low fertility soils. Boneseed also tolerates salinity and one of its alternate common names is Saltbush. Boneseed is spread by local seed drop and through its fruit which is attractive to birds which causes both local and more distant spread.

8.2 Proposed Plan

ORC is proposing that Boneseed is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

8.3 NPD Section 6 Assessment

8.3.1 Level of analysis

The assessed level of analysis for Boneseed under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

8.3.2 Impacts of Boneseed

Boneseed has the potential to cause loss of biodiversity on coastal areas.

8.3.3 Benefits for management of Boneseed

Prevention of loss of biodiversity and additional control costs. Net benefits are NPV \$40,000 relative to the pest being kept at its current level. There is also the prevention of any impacts to biodiversity on an area of 990 ha after 100 years if the pest is allowed to spread.

8.3.4 Costs of Boneseed Plan

The plan will incur costs of control, inspection and monitoring. These are \$6,500 annually for the plan option. Costs for all three options considered are a NPV of NPV \$30,000 for Sustained Control, NPV \$100,000 for Progressive Containment, and NPV \$100,000 for Eradication (which has a shorter time frame).

8.3.5 Risks of Boneseed Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, and requires adaptation of management techniques by farmers.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

8.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Do Nothing option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 990 ha, and intergenerational implications that should be taken into account.

In order for the proposed plan to be worthwhile there would need to be a benefit associated with preventing damage to biodiversity of \$370/ha in order for the plan to be worthwhile (see Table 2 below).

Table 1: Outcomes of analysis of costs and benefits for Boneseed

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$90,000		
Eradication	\$770,000	-\$680,000	-\$740,000
Progressive Containment	\$410,000	-\$320,000	-\$430,000
Sustained Control	\$200,000	-\$110,000	-\$140,000

Table 2: Minimum value of biodiversity protected if option is to be positive

Plan	Minimum value of biodiversity needed for plan to be positive (\$/ha)	Minimum risk adjusted value of biodiversity for plan to be positive (\$/ha)
Eradication	\$690	\$750
Progressive Containment	\$320	\$370
Sustained Control	\$110	\$120

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Do Nothing
Time to full occupation 50% of base	Do Nothing
Time to full occupation 150% of base	Do Nothing
Distance of spread 50% of base	Do Nothing
Distance of spread 200% of base	Do Nothing
Cost of control +20% from base	Do Nothing
Cost of control -20% from base	Do Nothing
Loss of production impacts -20% from base	Do Nothing
Loss of production impacts +20% from base	Do Nothing
Discount rate 4%	Do Nothing
Discount rate 8%	Do Nothing

8.4 NPD Section 7 - Allocation of Costs and Benefits

8.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Boneseed

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Wider community from prevention of damage to biodiversity and amenity values.
- Active exacerbators: Any persons transporting Boneseed into or around the region
- Passive exacerbators: Any persons with Boneseed on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Boneseed

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$200,000	\$30,000
Progressive Containment	\$400,000	\$100,000
Eradication	\$800,000	\$100,000

Table 5: Benefits and costs of plan for Boneseed that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Required benefit for community for biodiversity and ecological benefits in order for option to be positive	Costs for exacerbators
Sustained Control	\$-157,036	\$40,000	\$110,000	\$200,000
Progressive Containment	\$-358,032	\$40,000	\$320,000	\$400,000
Eradication	\$-708,306	\$40,000	\$680,000	\$800,000

8.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Boneseed plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Early infestation with only 48 sites in Otago.
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values. Can be targeted through general rate.
Practicality of targeting exacerbators	Locations are limited and know, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for Boneseed for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

8.4.3 Proposed allocation of costs

The benefits of boneseed accrue to the wider community, and therefore the General Rate should be used for the beneficiary share. Because it is susceptible to grazing pressure management will have an effect on the prevalence of boneseed and therefore there are likely to be some gains from exacerbator control. Given that the plan is to manage spread, the control required to prevent spread should be funded from land holders as exacerbators. The recommended approach therefore is:

- Cost of inspection and monitoring – General Rate
- Cost of control to prevent spread – Land holder control
- Cost of control in difficult to access areas or to reduce prevalence – General Rate.

9 Bur Daisy

9.1 Description

Bur Daisy (*Calotis lapulacea*) is a small perennial herb that grows up to 40cm tall and has many fine green branches. It causes damage to the wool industry because the seed burs lodge in sheep fleeces and increase costs for their removal. Bur Daisy also replaces productive plant species on dry, eroded hill slopes, and rocky outcrops, and if uncontrolled will move onto productive hill country. Bur daisy is present on only one site in Otogo, but has potential to occupy dry hill country across the region.

9.2 Proposed Plan

ORC is proposing that Bur Daisy is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

9.3 NPD Section 6 Assessment

9.3.1 Level of analysis

The assessed level of analysis for Bur Daisy under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

9.3.2 Impacts of Bur Daisy

Bur Daisy has the potential to cause loss of production from pastoral agriculture in hill and high country.

9.3.3 Benefits for management of Bur Daisy

Prevention of loss of production from pastoral agriculture in hill and high country. Net benefits are NPV \$3,000,000 relative to the pest being kept at its current level. There is also the prevention of any impacts to biodiversity on an area of 1750 ha after 100 years if the pest is allowed to spread.

9.3.4 Costs of Bur Daisy Plan

The plan will incur costs of control, inspection and monitoring. These are \$1800 annually for the plan option. Costs for all three options considered are a NPV of NPV \$7,000 for Sustained Control, NPV \$30,000 for Progressive Containment, and NPV \$30,000 for Eradication (which has a shorter time frame).

9.3.5 Risks of Bur Daisy Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, and requires adaptation of management techniques by farmers.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

9.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Progressive Containment option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below, and suggests that either Progressive Containment or Eradication are likely to be the highest value options. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 1750 ha, and intergenerational implications that should be taken into account.

These factors suggest that the Progressive Containment option is favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable.

Table 1: Outcomes of analysis of costs and benefits for Bur Daisy

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$2,650,000		
Eradication	\$7,000	\$2,650,000	\$1,660,000
Progressive Containment	\$1,000	\$2,650,000	\$1,670,000
Sustained Control	\$2,000	\$2,650,000	\$1,580,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Progressive Containment
Discount rate 8%	Progressive Containment

9.4 NPD Section 7 - Allocation of Costs and Benefits

9.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Bur Daisy

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits.
- Active exacerbators: Any persons transporting Bur Daisy into or around the region.
- Passive exacerbators: Any persons with Bur Daisy on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Bur Daisy

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$1,000	\$7,000
Progressive Containment	\$3,000	\$30,000
Eradication	\$6,000	\$30,000

Table 5: Benefits and costs of plan for Bur Daisy that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$100	\$3,000,000	\$1,000
Progressive Containment	\$-1261	\$3,000,000	\$3,000
Eradication	\$-3800	\$3,000,000	\$6,000

9.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Bur Daisy plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Early infestation with only one site in Otago.
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values and the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Locations are limited and know, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while generate rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for Bur Daisy for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

9.4.3 Proposed allocation of costs

Because the benefits of Bur Daisy are primarily productive the costs of the plan should be largely borne by a rural rate targeted at productive land uses. The use of land holder control is appropriate given the gains to individual land holders and the potential for improved management to have an effect, although a contribution from rates to assist with control may be appropriate to ensure that it is done well. The recommended approach therefore is:

- Costs of inspection and monitoring - Rural rate targeted at productive properties.
- Control – Land holders with the Bur Daisy present on the property as exacerbators with some potential for contribution from the rural rate to ensure effective control.

10 Cape Ivy

10.1 Description

Cape Ivy (*Senecio angulatus*) is a scrambling perennial, often forming a dense tangled shrub to 2-3 m tall, with wiry to woody stems that are sparingly branched. It produces many long-lived seeds that are wind dispersed a long way from parent plants, and it tolerates salt, wind, drought, semi-shade and damage. It is found in coastal areas, rocky areas, cliffs, bush edges, regenerating lowland forests and smothers ground and low-growing plants to 3 m tall, forming dense, long-lived mats that prevent the establishment of native plant seedlings.

10.2 Proposed Plan

ORC is proposing that Cape Ivy is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

10.3 NPD Section 6 Assessment

10.3.1 Level of analysis

The assessed level of analysis for Cape Ivy under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

10.3.2 Impacts of Cape Ivy

Cape Ivy has the potential to cause biodiversity in a range of habitats.

10.3.3 Benefits for management of Cape Ivy

The benefits of management of Cape Ivy is the prevention of any impacts to biodiversity on an area of 4650 ha after 100 years if the pest is allowed to spread.

10.3.4 Costs of Cape Ivy Plan

The plan will incur costs of control, inspection and monitoring. These are \$4500 annually for the plan option. Costs for all three options considered are a NPV of NPV \$20,000 for Sustained Control, NPV \$70,000 for Progressive Containment, and NPV \$80,000 for Eradication (which has a shorter time frame).

10.3.5 Risks of Cape Ivy Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, particularly with a wind dispersed plant.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

10.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Progressive Containment option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below and suggests that it is relatively robust to changes in individual parameters. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 4650 ha, and intergenerational implications that should be taken into account.

These factors suggest that the Progressive Containment option is strongly favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable. Particularly important to this conclusion is the assumption that 10% of the area affected would be controlled in the absence of the plan.

Table 1: Outcomes of analysis of costs and benefits for Cape Ivy

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$7,830,000		
Eradication	\$110,000	\$7,720,000	\$4,850,000
Progressive Containment	\$60,000	\$7,770,000	\$4,930,000
Sustained Control	\$9,000	\$7,820,000	\$2,310,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Progressive Containment
Discount rate 8%	Progressive Containment

10.4 NPD Section 7 - Allocation of Costs and Benefits

10.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Cape Ivy

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Community from prevention of damage to biodiversity values.
- Active exacerbators: Any persons transporting Cape Ivy into or around the region.
- Passive exacerbators: Any persons with Cape Ivy on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Cape Ivy

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$10,000	\$20,000
Progressive Containment	\$60,000	\$70,000
Eradication	\$100,000	\$80,000

Table 5: Benefits and costs of plan for Cape Ivy that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$-6,647	\$8,000,000	\$10,000
Progressive Containment	\$-56,365	\$8,000,000	\$60,000
Eradication	\$-108,257	\$8,000,000	\$100,000

10.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Cape Ivy plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Well established with 60 sites in Otago.
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values and the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Locations are limited and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for Cape Ivy for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

10.4.3 Proposed allocation of costs

Cape Ivy is sufficiently widespread for council control to no longer be cost effective, and it is likely that landholder control as exacerbators will be most efficient. This will ensure that landholders manage land, particularly in the city, to minimise the risk of Cape Ivy infestations. For large infestations on private land council should fund initial control costs through general rate because the costs to landholders would not be reasonable.

The benefits from the management of Cape Ivy accrue to the general community from prevention of damage to biodiversity values and reduced future control costs. It is therefore appropriate that the inspection and monitoring costs be funded through General Rate.

11 Nassella Tussock

11.1 Description

Nassella Tussock is a tall erect grass tussock, originally a native of South America, and probably introduced to New Zealand around the turn of the century. It grows to 1.5 - 2m tall and produces a large number of seeds from the first year of life. The seeds are spread by wind, animals, and water. Nassella Tussock is present in 100,000 ha of Canterbury distributed among 3 main areas. Nassella Tussock is strongly invasive of most land at altitudes under 600m, although its invasiveness will be constrained by land use in the more productive land. It is estimated that 1.5 million ha could potentially be infested with Nassella Tussock in Otago. Nassella Tussock is strongly invasive of the semi-arid country and short tussock grasslands which will cause damage to conservation values in ecologically valuable areas.

11.2 Proposed Plan

ORC is proposing that Nassella Tussock is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

11.3 NPD Section 6 Assessment

11.3.1 Level of analysis

The assessed level of analysis for Nassella Tussock under the requirements of the NPD and using the Guidance approach is Level 2. The detail of the requirement for assessment is shown in Appendix B.

11.3.2 Impacts of Nassella Tussock

Nassella Tussock has the potential to cause loss of production from pastoral agriculture in hill and high country.

11.3.3 Benefits for management of Nassella Tussock

Prevention of loss of production from pastoral agriculture in hill and high country. Net benefits are NPV \$228,000,000 relative to the pest being kept at its current level. There is also the prevention of any impacts to biodiversity on an area of 146,150 ha after 100 years if the pest is allowed to spread.

11.3.4 Costs of Nassella Tussock Plan

The plan will incur costs of control, inspection and monitoring. These are \$45,000 annually for the plan option. Costs for all three options considered are a NPV \$40,000 for Sustained Control, NPV \$700,000 for Progressive Containment, and NPV \$2,000,000 for Eradication (which has a shorter time frame).

11.3.5 Risks of Nassella Tussock Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, and requires adaptation of management techniques by farmers. Nassella Tussock has been under control for a long period with limited progress.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

11.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 23 below. In terms of those alternatives considered, the Sustained Control option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 26 below which suggests that the Sustained Control remains the highest value option with changes to single assumptions. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 140,000 ha that should be taken into account.

Progressive Containment would be justified as higher value if the risks of non-achievement were considered to be lower than have been assumed for this analysis. However it should be noted that work undertaken by AgResearch in Canterbury showed that even with intensive inspection and annual control a number of plants were missed and set seed every year, and there was no overall trend in Nassella occurrence based on transects through infested areas.

Table 23: Outcomes of analysis of costs and benefits for Nassella Tussock

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$264,140,000		
Eradication	\$77,210,000	\$186,930,000	\$87,680,000
Progressive Containment	\$29,550,000	\$234,590,000	\$111,970,000
Sustained Control	\$22,710,000	\$241,430,000	\$119,670,000

Table 24: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Sustained Control
Time to full occupation 50% of base	Sustained Control
Time to full occupation 150% of base	Sustained Control
Distance of spread 50% of base	Sustained Control
Distance of spread 200% of base	Sustained Control
Cost of control +20% from base	Sustained Control
Cost of control -20% from base	Sustained Control
Loss of production impacts -20% from base	Sustained Control
Loss of production impacts +20% from base	Sustained Control
Discount rate 4%	Sustained Control
Discount rate 8%	Sustained Control

11.4 NPD Section 7 - Allocation of Costs and Benefits

11.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Nassella Tussock

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits.
- Active exacerbators: Any persons transporting Nassella Tussock into or around the region
- Passive exacerbators: Any persons with Nassella Tussock on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Nassella Tussock

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$15,000,000	\$400,000
Progressive Containment	\$29,000,000	\$700,000
Eradication	\$77,000,000	\$2,000,000

Table 5: Benefits and costs of plan for Nassella Tussock that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Required benefit for community for biodiversity and ecological benefits in order for option to be positive	Costs for exacerbators
Sustained Control	\$6,350,000	\$235,000,000	\$-241,430,000	\$15,000,000
Progressive Containment	\$-448,880	\$235,000,000	\$-234,590,000	\$29,000,000
Eradication	\$-48,350,736	\$235,000,000	\$-186,930,000	\$77,000,000

11.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Nassella Tussock plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Early infestation with four areas of infestation in Otago.
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Moderate urgency to prevent further spread outside current sites.
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values and the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Locations are limited and known, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for Bur Daisy for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

11.4.3 Proposed allocation of costs

The benefits of the plan are largely to the rural community that is not currently affected. However the pest is widespread and control being undertaken by landholders will encourage improved management of land to prevent infestations and spread. The proposed allocation of costs is therefore:

- Control costs – landholders with nassella tussock on their property as exacerbators.
- Inspection and monitoring costs – rural landholders for prevention of spread of nassella tussock onto uninfested land.

12 Old Mans Beard

12.1 Description

Old Man's Beard (*Clematis vitalba*) is a climbing and creeping vine which is considered a danger because of its potential to smother trees and scrub. The major habitats of concern are regenerating native forest and forest remnants, river and amenity plantings, and shelterbelts. *Clematis vitalba* seeds mostly during the winter months although seed can fall all year round in some habitats. The seed remains viable for 5 – 10 years and plant growth can be extremely fast – up to 4m in one growing season. The seed is spread by rivers and wind, with some bird and human spread. *C.vitalba* requires well drained and fertile soils, and is susceptible to grazing.

The main means of control for Old Man's Beard is chemical and mechanical – cutting of vines in winter and application of chemicals to the stumps. Due to buried seed, a control programme for up to 10 years is required to ensure that the plant does not reoccur at the site.

12.2 Proposed Plan

ORC is proposing that Old Mans Beard is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

12.3 NPD Section 6 Assessment

12.3.1 Level of analysis

The assessed level of analysis for Old Mans Beard under the requirements of the NPD and using the Guidance approach is Level 2. The detail of the requirement for assessment is shown in Appendix B.

12.3.2 Impacts of Old Mans Beard

Old Mans Beard has the potential to cause loss of biodiversity through smothering and displacing native vegetation.

12.3.3 Benefits for management of Old Mans Beard

Prevention of loss biodiversity. Net benefits are NPV \$35,000,000 relative to the pest being kept at its current level through prevented control action. There is also the prevention of any impacts to biodiversity on an area of 68,000 ha after 100 years if the pest is allowed to spread.

12.3.4 Costs of Old Mans Beard Plan

The plan will incur costs of control, inspection and monitoring. These are \$130,000 annually for the plan option. Costs for all three options considered are a NPV of NPV \$100,000 for Sustained Control, NPV \$2,000,000 for Progressive Containment, and NPV \$5,000,000 for Eradication (which has a shorter time frame).

12.3.5 Risks of Old Mans Beard Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, and requires adaptation of management techniques by farmers. Old Mans Beard has been under control for a long period with limited progress.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

12.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Progressive Containment option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 68,000 ha that should be taken into account.

These factors suggest that the Progressive Containment option is strongly favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable.

Table 1: Outcomes of analysis of costs and benefits for Old Mans Beard

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$36,100,000		
Eradication	\$35,460,000	\$630,000	-\$5,170,000
Progressive Containment	\$14,370,000	\$21,730,000	\$10,150,000
Sustained Control	\$3,750,000	\$32,350,000	\$8,270,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Progressive Containment
Discount rate 8%	Progressive Containment

12.4 NPD Section 7 - Allocation of Costs and Benefits

12.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Old Mans Beard

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Wider community from prevention of impacts on biodiversity and amenity values.
- Active exacerbators: Any persons transporting Old Mans Beard into or around the region.
- Passive exacerbators: Any persons with Old Mans Beard on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Old Mans Beard

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$4,000,000	\$100,000
Progressive Containment	\$14,000,000	\$2,000,000
Eradication	\$35,000,000	\$5,000,000

Table 5: Benefits and costs of plan for Old Mans Beard that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$-2,991,158	\$35,000,000	\$4,000,000
Progressive Containment	\$-13,460,212	\$35,000,000	\$14,000,000
Eradication	\$-34,594,248	\$35,000,000	\$35,000,000

12.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Old Mans Beard plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Well established with 120 sites in Otago.
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values.
Practicality of targeting exacerbators	Locations are limited and know, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for Old Man's Beard for some time. Assistance may be required for large infestations on private land as control costs may be unreasonably high.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

12.4.3 Proposed allocation of costs

The benefits of the plan are largely to the wider community for prevention of damage to biodiversity. The pest is widespread and control being undertaken by landholders will encourage better identification and control of the pest. The proposed allocation of costs is therefore:

- Control costs – landholders with old mans beard on their property as exacerbators. For large infestations on private land council should fund initial control costs through general rate because the costs to landholders would not be reasonable.
- Inspection and monitoring costs – wider community through general rate for prevention of damage to biodiversity values and saved future control costs.

13 Perennial Nettle

13.1 Description

Perennial nettle can grow up to 1.5 metres high. Its stems are woody, its flowers are green and its leaf is a lighter colour green than common stinging nettle (*Urtica urens*). It grows taller than common stinging nettle and it has an extensive system of underground rhizomes, whereas common nettle does not have rhizomes. The seeds are 1 to 1.5mm long, flat, oval and yellow to greyish in colour. Its underground rhizomes can spread 2.5m in a season.

It is a particular problem in South Otago mainly Balclutha, Lawrence and Clydevale (along the Clutha River).

The sting causes itching and burning which may last for several days. Animals shy away from the plant because of its stinging hairs. The pollen from this plant may cause hay fever.

Perennial Nettle's extensive system of underground rhizomes, and its ability to form tall dense stands means it can easily invade paddocks and dominate good pasture. It tolerates a wide range of conditions, soil types and localities from shade and damp, to very dry. It can be found in pastures, in areas where stock shelter or congregate, waste areas, river banks, roadsides and old house sites.

13.2 Proposed Plan

ORC is proposing that Perennial Nettle is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

13.3 NPD Section 6 Assessment

13.3.1 Level of analysis

The assessed level of analysis for Perennial Nettle under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

13.3.2 Impacts of Perennial Nettle

Perennial Nettle has the potential to cause loss of production from pastoral agriculture.

13.3.3 Benefits for management of Perennial Nettle

Prevention of loss of production from pastoral agriculture. Net benefits are NPV \$13,000,000 relative to the pest being kept at its current level. There is also the prevention of any impacts to biodiversity on an area of 21,000 ha after 100 years if the pest is allowed to spread.

13.3.4 Costs of Perennial Nettle Plan

The plan will incur costs of control, inspection and monitoring. These are \$2500 annually for the plan option. Costs for all three options considered are a NPV of NPV \$10,000 for Sustained Control, NPV \$40,000 for Progressive Containment, and NPV \$60,000 for Eradication.

13.3.5 Risks of Perennial Nettle Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, and requires adaptation of management techniques by farmer.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

13.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Progressive Containment option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below and the analysis suggests that the conclusion is robust to changes in a number of single assumptions. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 21350 ha that should be taken into account.

These factors suggest that the Progressive Containment option is strongly favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable.

Table 1: Outcomes of analysis of costs and benefits for Perennial Nettle

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$13,360,000		
Eradication	\$1,180,000	\$12,190,000	\$7,910,000
Progressive Containment	\$480,000	\$12,890,000	\$8,300,000
Sustained Control	\$130,000	\$13,230,000	\$3,940,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Progressive Containment
Discount rate 8%	Progressive Containment

13.4 NPD Section 7 - Allocation of Costs and Benefits

13.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Perennial Nettle

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits.
- Active exacerbators: Any persons transporting Perennial Nettle into or around the region
- Passive exacerbators: Any persons with Perennial Nettle on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Perennial Nettle

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$100,000	\$10,000
Progressive Containment	\$500,000	\$40,000
Eradication	\$1,000,000	\$60,000

Table 5: Benefits and costs of plan for Perennial Nettle that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$-23,898	\$13,000,000	\$100,000
Progressive Containment	\$-367,721	\$13,000,000	\$500,000
Eradication	\$-1,072,189	\$13,000,000	\$1,000,000

13.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Perennial Nettle plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Well established with 15 sites in Otago.
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values and the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Locations are limited and know, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for some time..
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

13.4.3 Proposed allocation of costs

The benefits of the plan are largely to the rural community that is not currently affected. However the pest is moderately widespread and control being undertaken by landholders will encourage improved management of land to prevent infestations and spread. The proposed allocation of costs is therefore:

- Control costs – landholders with perennial nettle on their property as exacerbators.
- Inspection and monitoring costs – rural landholders for prevention of spread of perennial nettle tussock onto uninfested land.

14 Spartina

14.1 Description

Spartina is a perennial estuarine sward grass, commonly one metre tall and growing in shallow saltwater. It has stiff, upright stems, originating from thick rhizomes. The stems have broad, pointed leaves from their base to the top, where several long fingers contain the seed. New growth occurs from either root pieces or seed. Shoots rapidly sprout from belowground rhizomes, while the seed falls into the water and floats away.

Scattered infestations occur in Pleasant River Estuary, Karitane Estuary, the Lower Taieri Gorge and Catlins lake.

Colonies of spartina form dense grassy clumps, and these can spread laterally from underground rhizomes, or by over ground side shoots (tillers). Within the estuarine area, vast meadows can form causing a build-up of sediment. This can increase the risk of flooding and also alter the habitat for wading bird species and other estuarine flora and fauna

14.2 Proposed Plan

ORC is proposing that Spartina is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

14.3 NPD Section 6 Assessment

14.3.1 Level of analysis

The assessed level of analysis for Spartina under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

14.3.2 Impacts of Spartina

Spartina has the potential to cause loss of biodiversity in estuarine ecosystems and increase the potential for flooding.

14.3.3 Benefits for management of Spartina

Prevention of loss of biodiversity on an area of 630 ha after 100 years if the pest is allowed to spread.

14.3.4 Costs of Spartina Plan

The plan will incur costs of control, inspection and monitoring. These are \$17,660 annually for the plan option. Costs for all three options considered are a NPV \$70,000 for Sustained Control, NPV \$300,000 for Progressive Containment, and NPV \$400,000 for Eradication (which has a shorter time frame).

14.3.5 Risks of Spartina Plan

Technical and operational risks: Spartina has been under control for a long period with limited progress.

Implementation and compliance: Control will be undertaken by public agencies so minimal compliance risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

14.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Do Nothing option has the highest net value before biodiversity values are taken into account. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 630 ha that should be taken into account.

In order for the proposed plan to be worthwhile there would need to be a benefit associated with preventing damage to biodiversity of \$6430/ha in order for the plan to be worthwhile (see Table 2 below). If Sustained Control were the option, the value assigned to biodiversity would be only \$3,270/ha assuming that spread could be prevented through this option.

These factors suggest that the Sustained Control is likely to be the preferred option if a value in excess of NPV \$3270 or \$200/ha/year is assigned to estuarine biodiversity values. Progressive Containment would be considered higher value if the risks of further spread were too high under Sustained Control.

Table 1: Outcomes of analysis of costs and benefits for Spartina

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$980,000		
Eradication	\$19,650,000	-\$18,670,000	-\$11,750,000
Progressive Containment	\$7,890,000	-\$6,900,000	-\$5,580,000
Sustained Control	\$3,740,000	-\$2,760,000	-\$2,090,000

Table 2: Minimum value of biodiversity protected if option is to be positive

Plan	Minimum value of biodiversity needed for plan to be positive (\$/ha)	Minimum risk adjusted value of biodiversity for plan to be positive (\$/ha)
Eradication	\$29,630	\$22,330
Progressive Containment	\$10,950	\$8,630
Sustained Control	\$4,380	\$3,270

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Do Nothing
Time to full occupation 50% of base	Do Nothing
Time to full occupation 150% of base	Do Nothing
Distance of spread 50% of base	Do Nothing
Distance of spread 200% of base	Do Nothing
Cost of control +20% from base	Do Nothing
Cost of control -20% from base	Do Nothing
Loss of production impacts -20% from base	Do Nothing
Loss of production impacts +20% from base	Do Nothing
Discount rate 4%	Do Nothing
Discount rate 8%	Do Nothing

14.4 NPD Section 7 - Allocation of Costs and Benefits

14.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Spartina

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Wider community from prevention of damage to estuarine biodiversity values.
- Active exacerbators: Any persons transporting Spartina into or around the region
- Passive exacerbators: Any persons with Spartina on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Spartina

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$4,000,000	\$70,000
Progressive Containment	\$8,000,000	\$300,000
Eradication	\$20,000,000	\$400,000

Table 5: Benefits and costs of plan for Spartina that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Required benefit for community for biodiversity and ecological benefits in order for option to be positive	Costs for exacerbators
Sustained Control	\$-3,323,509	\$600,000	\$2,760,000	\$4,000,000
Progressive Containment	\$-7,476,496	\$600,000	\$6,900,000	\$8,000,000
Eradication	\$-19,219,026	\$600,000	\$18,670,000	\$20,000,000

14.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Spartina plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Well established but limited number of sites.
Most effective control agents	Land is not privately owned so public agencies most effective for control.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	There are few alternative options for effective control to public agencies. Voluntary action is unlikely to be effective.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values.
Practicality of targeting exacerbators	No specific exacerbators as no private land.
Administrative efficiency	General rate would have greater administrative efficiency.
Security	Rating mechanisms are most secure.
Fairness	Benefits accrue to the wider community, and there are no targetable exacerbators.
Reasonable	Costs may be high in some areas.
Parties bearing indirect costs	None likely.
Transitional cost allocation arrangements	None required as spartina has been under control for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

14.4.3 Proposed allocation of costs

The benefits of the control of Spartina accrue to the wider community, and there are no targetable exacerbators. Control and inspection should be funded from the general rate.

15 White-edged nightshade

15.1 Description

White-edged nightshade is a quick growing perennial shrub that can grow up to 5 metres tall. The large woody stems and green oak-shaped leaves are covered in sharp spines. Its leaves have white veins on the upper surface and dense chalky-white hairs on the underside. In summer white or pale mauve flowers bloom in clusters at the end of branches. Green-yellow tomato-shaped berries grow on the ends of prickly stalks.

It is confined to one site near Hampden, but is also known to have existed on Quarantine Island in the Otago harbour.

The shrub is well adapted to dry areas. Once established, it forms dense thickets that are impenetrable to stock. It also prevents the establishment of native understory on margins of native bush.

15.2 Proposed Plan

ORC is proposing that White-edged nightshade is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

15.3 NPD Section 6 Assessment

15.3.1 Level of analysis

The assessed level of analysis for White-edged nightshade under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

15.3.2 Impacts of White-edged nightshade

White-edged nightshade has the potential to cause damage to biodiversity values and loss of production from pastoral agriculture in hill and high country.

15.3.3 Benefits for management of White-edged nightshade

Prevention of any impacts to biodiversity on an area of 16,000 ha after 100 years if the pest is allowed to spread. Prevention of loss of production from pastoral agriculture in hill and high country. Net benefits are NPV \$50000 relative to the pest being kept at its current level.

15.3.4 Costs of White-edged nightshade Plan

The plan will incur costs of control, inspection and monitoring. These are \$500 annually for the plan option. Costs for all three options considered are a NPV of NPV \$2,000 for Sustained Control, NPV \$8,000 for Progressive Containment, and NPV \$9,000 for Eradication (which has a shorter time frame).

15.3.5 Risks of White-edged nightshade Plan

Technical and operational risks: None known.

Implementation and compliance: Ensuring compliance with management regime will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

15.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Progressive Containment option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below and is sensitive to a variety of assumptions with both Eradication and Sustained Control being the preferred option under different sets of assumptions. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 16,000 ha that should be taken into account.

These factors suggest that the Progressive Containment option is favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable, although the decision makers may wish to consider the outcomes under alternative assumptions.

Table 1: Outcomes of analysis of costs and benefits for White-edged nightshade

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$110,000		
Eradication	\$10,000	\$90,000	\$40,000
Progressive Containment	\$6,000	\$100,000	\$50,000
Sustained Control	\$3,000	\$100,000	\$30,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Progressive Containment
Discount rate 8%	Progressive Containment

15.4 NPD Section 7 - Allocation of Costs and Benefits

15.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of White-edged nightshade

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Wider community from prevention of damage to biodiversity values, and rural community from prevention of spread and production benefits.
- Active exacerbators: Any persons transporting White-edged nightshade into or around the region
- Passive exacerbators: Any persons with White-edged nightshade on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for White-edged nightshade

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$3,000	\$2,000
Progressive Containment	\$6,000	\$8,000
Eradication	\$10,000	\$9,000

Table 5: Benefits and costs of plan for White-edged nightshade that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$-3,000	\$100,000	\$3,000
Progressive Containment	\$-6,000	\$100,000	\$6,000
Eradication	\$-11,000	\$100,000	\$10,000

15.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed White-edged nightshade plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Early infestation with only one site in Otago.
Most effective control agents	Landholders are most effective because it requires integration with land management.
Urgency	Moderate urgency to prevent spread
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values and the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Locations are limited and known, and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for White edged nightshade for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

15.4.3 Proposed allocation of costs

The benefits of the plan are largely to the wider community for prevention of damage to biodiversity, but also to the rural community for prevention of damage to production values.

Control being undertaken by landholders will encourage improved management of land to prevent infestations and spread. The proposed allocation of costs is therefore:

- Control costs – landholders with white edged nightshade on their property as exacerbators.
- Inspection and monitoring costs
 - 50% wider community through general rate for prevention of damage to biodiversity values and saved future control costs.
 - 50% rural community for prevention of damage to production values through a targeted rural rate.

16 Wilding Conifers

Wilding conifers and the associated analysis refers to plants that have spread naturally, with low economic benefits and with potential to spread further in an uncontrolled manner. It is appropriate to group these species because they behave similarly, occupy similar habitat, and in some cases occur as mixed stands that must be controlled together. In addition to naturally spread species it covers all occurrences of the following conifer species:

Contorta (lodgepole) pine	<i>Pinus contorta</i>
Corsican pine	<i>Pinus nigra</i>
Larch	<i>Larix decidua</i>
Mountain pine and dwarf mountain pine	<i>Pinus mugo and P. uncinata</i>
Scots pine	<i>Pinus sylvestris</i>

16.1 Proposed programme

ORC is proposing that Wilding Conifers are controlled through a Progressive Containment regime. It may be that differential levels of effort will be applied to different areas depending on the risk of spread and damage to biodiversity values.

16.2 NPD Section 6 Assessment

16.2.1 Level of analysis

The assessed level of analysis for Wilding Conifers under the requirements of the NPD and using the Guidance approach is Level 3. The detail of the requirement for assessment is shown in Appendix B.

16.2.2 Method

The method is adapted from Velarde, Paul, Monge, & Yao, (2015) with that publication providing assumptions and other information. This information was combined with the plant pest spread model to estimate a combination of area infested and occupation, which was not estimated directly by Velarde et al. (2015) paper. This section should be read in conjunction with Section 5 which describes the plant pest model in greater detail. Key assumptions are detailed below.

Rate of spread – the rate of spread for Wilding Conifers was adapted from Velarde *et al.* (2015) by converting the formula they used for estimating the national rate of spread to account for the estimated current area infested in Otago (42,188 ha⁸). This gave a formula of:

$$Area_t = 6.6262E - 10 \times t^{7.192}$$

Where Area = area in ha, t = time since 1900 when it is assumed that wildings first occurred in the region.

This formula was then used to estimate the time since 1900 when the full habitat was occupied, which is the year 2045, or approximately 30 years from now. The annual distance of spread was then adjusted in the pest spread model through trial and error so that the year when the full habitat was infested with some level of wildings occurred in 2045, which is a spread distance of 150m/year. This approach allows the model to replicate the approach taken by

⁸ From Wildlands 2016

the Velarde *et al.*(2015) paper of increasing each infestation in concentric circles with a given distance of spread. The approach here is likely to produce a lower estimate of spread because a mathematical rather than GIS based approach is used in the model, which means that interaction between different infestations sites is not taken into account. However, because the year in which the full habitat is infested is unaltered, the difference in costs should not be significant and will be within the error bounds for the study.

Estimate of productive land affected – an estimate of the proportion of land affected that was productive was made based on the proportion of infested land in public and private ownership currently from Velarde *et al.*(2015). This gave an estimate of 46% of land in private ownership which was used directly as an estimate of productive land.

Estimating the impact on water yield – the Velarde *et al.*(2015) report uses an estimate of 46% reduction on water yield from wilding infested catchments with complete cover. They multiply this by the proportion of the region in wildings, and use GDP as a proxy for the impact on irrigation. It is likely that the impacts on water yield, hydro generation, and irrigation are highly complex because the impacts will depend on the source catchment (alpine river, foothills river, lowland streams, and groundwater), since each of these has different susceptibility to wildings. They will also be affected by the timing of the water yield reduction and the location of the wilding populations.

Nevertheless the approach adopted in Velarde *et al.*(2015) is considered sufficient for the purposes of this study. The reduction in water yield is, however, assumed to be 20%, which is less than half the assumption used in the Velarde *et al.* (2015) report. This is to allow for potential differences in land type and climatic patterns between the study sites where the yield measurements were made and the situation that exists in Otago. It also ensures that the estimate is conservative in relation to the impacts on irrigation. The assumption is that there is a linear relationship between the reduction in water yield and irrigation impacts. Hydro impacts are not considered likely to be major in Otago because the major hydro resource in Lake Manapouri is currently forested and therefore not particularly vulnerable to impacts from wilding invasion.

Hydro impacts are calculated for the Clutha catchment which is the largest hydro scheme in the region comprising the Clyde dam (2100GWh) and Roxburgh dam (1650GWh). There is also the Waipori scheme near Dunedin which has an annual capacity of 192GWh and although this is also potentially affected by wildings it is relatively minor part of the region's generation capacity. The hydro impact in the Clutha is estimated by calculating the share of the catchment that is vulnerable to wilding pines (55%) and multiplying this proportion by the total estimated gross revenue of the catchment (less an allowance for 6% spillage). This gives an estimate of \$66.34/ha/annum of wilding prone land that is occupied. The hydro impacts for land occupied in the model are assumed to occur in proportion to the Clutha share of wilding prone land (36% of Class 6 and 7 land is in the Clutha), giving an average loss per ha occupied by wildings in Otago of \$23.75/ha/annum.

The impact on irrigation for the catchment is estimated using the irrigated and dryland figures for an assessment of wilding impacts in Canterbury (Harris, 2016). The irrigated areas in Otago are estimated from Statistics NZ (2017) data as 92,080 ha. The impact of wildings is assumed to occur only on Class 6 and 7 land and only in proportion to the land potentially occupied by wildings (55%) which is \$19.08 /ha infested by wildings. This likely overestimates the total impact because a proportion of the irrigated area in Otago will source water from the Waitaki, which lies outside the region's boundaries. Nevertheless it provides an adequate estimate for the purposes of this study.

Biodiversity benefits - the biodiversity benefits in the Valerde et al. (2015) paper were estimated using a choice modelling experiment for three native species – *Hebe cupressoides*, *Brachasips robustus*, and *Galaxias macronasus* (Kerr & Sharp, 2007). In a study of household preferences on the impact of wilding pines, they suggest reasonable mid-range values for protection of these species are of \$70/household per annum, \$120/household per annum and \$140/household per annum, giving an aggregate \$330/household/annum. Multiplied by the 81,000 estimated households in Otago (Statistics NZ privately occupied dwellings) this gives an annual cost of \$26.7 million per annum. It is assumed that this benefit is all lost when wildings occupy their full potential habitat which gives an average biodiversity value of \$36.95/ha/annum for land currently unaffected.

Non quantified costs. There are a range of costs that have not been quantified here. These include:

- Reduction in tourist visits from reduced amenity values.
- Impact on recreational use of water, through reduction in amenity values and desirability of locations.
- Drinking water supply from reduction in available water.
- Landscape values, although this is dependent on the location, scale and density of wilding infestations.
- Cultural and historic values by impact on historic buildings and structures, and earthworks and *urupa* and grave sites from conifer trees and their roots.
- Increased fire risk from longer lasting fires and fires that are more expensive to control from the need for chemicals, heavier equipment, and the more frequent need for the use of aircraft. They may also increase insurance premiums and require maintenance in the form of firebreaks and access control.
- Honey production from the replacement of manuka shrublands and shading of flowering species. These impacts have not been costed.
- Carbon sequestration – the Wilding Conifers accumulate significant levels of carbon which potentially has a market value depending on their status and tradeability.
- Erosion control in unstable land.

Many of these are not realistically quantifiable within the scope of this study. The Valerde *et al.*(2015) report estimates the impact on international tourism, but this is not considered appropriate for a regional scale study due to a lack of any detailed information on tourism sites likely to be affected in Otago. Carbon sequestration values are potentially quantifiable based on the value of carbon (~\$18/NZU August 2016) and estimates are available of the amount of carbon sequestered per ha at maturity for plantation forestry. However, this report follows the guidance of Valerde *et al.*(2015) who consider the impacts are not able to be quantified because of uncertainty about the status of wilding forests in the Emissions Trading Scheme. It should be noted that at current carbon prices the gains from carbon sequestration are potentially very significant if the full potentially habitable area were infested with dense stands of wildings.

16.2.3 Impacts of Wilding Conifers

Wilding Conifers have the potential to cause loss of production on high country properties, and significant impacts on biodiversity in tussock grasslands. They may also cause impacts for irrigators and other water users through reduced water availability, honey production, and landscape and amenity values.

16.2.4 Benefits for management of Wilding Conifers

Prevention of loss of production on high country properties, and significant impacts on biodiversity in tussock grasslands. Wildings also cause losses for:

- Indigenous biodiversity from replacement of habitat and shading.
- Hydro generation through reduction of available water.
- Irrigation through a reduction in available water.
- Reduction in tourist visits from reduced amenity values.
- Impact on recreational use of water, through reduction in amenity values and desirability of locations.
- Drinking water supply from reduction in available water.
- Landscape values, although this is dependent on the location, scale and density of wilding infestations.
- Cultural and historic values by impact on historic buildings and structures, and earthworks and urupa and grave sites from conifer trees and their roots.
- Increased fire risk from longer lasting fires and fires that are more expensive to control from the need for chemicals, heavier equipment, and the more frequent need for the use of aircraft. They may also increase insurance premiums and require maintenance in the form of firebreaks and access control.
- Honey production from replacement of manuka shrublands and shading of flowering species. These impacts have not been costed.

Allowing wilding pines to spread will cause an additional NPV(6%) \$290 million in costs for control, lost production, reduced irrigation, and loss of biodiversity.

16.2.5 Costs of Wilding Conifers Programme

The plan will incur costs of control, inspection, and monitoring. These are \$120,000 annually for the Progressive Containment option. Costs for all three options considered are an NPV(6%) of \$500,000 for Sustained Control, NPV \$2,000,000 for Progressive Containment, and NPV \$3,000,000 for Eradication. In addition, the removal of wildings will incur costs from reduced:

- Carbon sequestration – the Wilding Conifers accumulate significant levels of carbon which potentially has a market value depending on their status and tradeability.
- Erosion control in unstable land.

16.2.6 Risks of Wilding Conifers Programme

Technical and operational risks: There are significant technical and operational risks with the control of wildings. They tend to occur across large areas of the landscape, and require individual control of scattered plants in order to halt spread. Wildings can occur in difficult to access locations and there are no reliable chemical control agents.

Implementation and compliance: There are significant risks to compliance with the plan because of the substantial costs that can be involved, coupled with the low productive value of the land. Furthermore, conifers are also planted for production purposes, and plantation forests do not always have associated plans for the management of wilding spread. This has created some opposition amongst land holders to requirements to manage wildings that impose costs on their operations. The low level of costs allowed to inspect and manage wildings increases the risk of non-achievement.

Other legislative risks: Some parties will have a consented right to grow conifer species, which may conflict with the requirements of the management plan. The status of wildings within the Emissions Trading Scheme may create risks for removing pre 1990s wilding stands, or by creating benefit from increasing infestations of wildings.

Public or political concerns: Wilding control in the high country is an emotive subject, with potentially high costs for land holders and iconic landscape values.

Other risks: None known

16.2.7 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the programme, as shown in Table 25, Table 26 and Table 27 below. In terms of those alternatives considered, the Progressive Containment option has the net benefit and the highest risk adjusted net value when risks associated with achievement of the objectives are taken into account. The sensitivity analysis in Table 28 shows that the conclusion that Progressive Containment has the highest risk adjusted net benefit is robust to a range of changes in the assumptions. The potential benefits associated with preventing damage to biodiversity on 300,000 ha of land are included in this analysis based on a non-market valuation study of endangered species in the high country. It should be noted that the non-market values estimated in that study may not cover the full range of values that are associated with biodiversity.

Because the analysis only takes a regional viewpoint, national benefits and costs have been excluded. However there are additional national benefits that will arise from Wilding Conifer control, and there may also be an input of national funding into reduction of areas infested by wilding conifers that will reduce the regional costs.

There are a range of other values that have not been covered by this study, including landscape values, impacts on rural firefighting costs etc., as detailed in Section 16.2.4 and 16.2.5. There are also intergenerational implications that should be taken into account because of the enormous cost of returning any infested land to the current state.

These factors suggest that the Progressive Containment option is favoured as producing the highest net benefit if the assumptions made in this analysis are considered reasonable and if the Council is satisfied about the value of biodiversity. However, it should be noted that the conclusion should have a disclaimer regarding the low level of inspection and monitoring costs assumed as required to achieve the outcomes, and the non-inclusion of other non-market

benefits and costs, because, for example: the returns from carbon sequestration could readily outweigh the net benefits calculated here.

Table 25: Scenario outcomes by item for Wilding Conifers

Item	Scenario outcome (\$ million NPV)			
	Do Nothing	Sustained Control	Progressive Containment	Eradication
Cost of control	\$35.9	\$83.1	\$315.7	\$785.4
Cost of lost production	\$246.2	\$149.5	\$3.2	\$0.0
Inspection, monitoring etc.	\$0.0	\$0.5	\$2.0	\$2.8
Hydro losses	\$178.2	\$107.3	\$0.0	\$0.0
Irrigation losses	\$143.2	\$86.3	\$0.0	\$0.0
Biodiversity losses	\$277.3	\$167.0	-\$0.1	\$0.0
Total	\$880.9	\$593.6	\$320.7	\$788.2

Table 26: Net benefit for plan option by item for Wilding Conifers

Item	Net Benefit (\$ million NPV)		
	Sustained Control	Progressive Containment	Eradication
Cost of control	-\$47.1	-\$279.8	-\$749.4
Cost of lost production	\$96.8	\$243.0	\$246.2
Inspection, monitoring etc.	-\$0.5	-\$2.0	-\$2.8
Hydro benefits	\$70.9	\$178.3	\$178.2
Irrigation benefits	\$57.0	\$143.3	\$143.2
Biodiversity benefits	\$110.3	\$277.4	\$277.3
Total	\$287.3	\$560.2	\$92.7

Table 27: Outcomes of analysis of costs and benefits for Wilding Conifers

Programme	Risk adjusted net benefit (NPV(6%) \$ million)
Eradication	-\$15
Progressive Containment	\$226
Sustained Control	\$89

Table 28: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Progressive Containment
Discount rate 8%	Progressive Containment

16.3 NPD Section 7 - Allocation of Costs and Benefits

16.3.1 Beneficiaries, exacerbators and costs of proposed programme for control of Wilding Conifers

The beneficiaries and exacerbators of the programme are:

- Beneficiaries: Wider community from prevention of impacts to biodiversity. Land holders from protection of production values.
- Active exacerbators: Any persons transporting Wilding Conifers into or around the region.
- Passive exacerbators: Any persons with Wilding Conifers on their property not undertaking control, or persons with plantation forestry which is spreading seeds onto neighbouring properties.

The direct and indirect costs associated with the programme are shown below in Table 29 and Table 30.

Table 29: Direct and indirect costs of programme for Wilding Conifers

Plan option	Control costs land holders (PV (6%))	Inspection and monitoring costs (PV (6%))
Sustained Control	\$83,000,000	\$500,000
Progressive Containment	\$316,000,000	\$2,000,000
Eradication	\$785,000,000	\$3,000,000

Table 30: Benefits and costs of programme for Wilding Conifers that accrue to different beneficiaries and exacerbators

Programme option	Benefits for those currently infested (PV (6%))	Benefits for those not currently infested (PV (6%))	Costs for exacerbators (PV (6%))
Sustained Control	\$39,820,000	\$609,000,000	\$83,000,000
Progressive Containment	\$-46,547,600	\$609,000,000	\$316,000,000
Eradication	\$-513,015,374	\$609,000,000	\$785,000,000

Table 31: Estimate of share of net benefit by benefit type for Progressive Containment option (% of total net benefit)

Item	Share of net benefit for Progressive Containment
Cost of control	-50%
Cost of lost production	43%
Inspection, monitoring etc.	0%
Hydro benefits	32%
Irrigation benefits	26%
Biodiversity benefits	50%
Total	100%

16.3.2 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 32 below.

Table 32: Matters for consideration in allocating costs for proposed Wilding Conifers programme

Legislative rights and responsibilities	None known.
Management objectives	Sustained Control.
Stage of infestation	Widespread but continuing to expand in suitable habitats in the high country.
Most effective control agents	The areas that wildings occupy are generally either not grazed, or grazed at low densities. The most effective control agents will depend on the circumstances but will involve a mixture of land holder and external agency control.
Urgency	There is moderate urgency to control wildings as the opportunity to prevent widespread occupation of high country habitats is limited.
Efficiency and effectiveness	The most efficient approach is likely to be requiring land holder control since they have management control over the land being infested. However, this is not always effective if the control required is widespread, difficult, and expensive. In those situations it may be more effective to undertake control directly, and require land holders to maintain the pest infestations at low levels. This also ensures an incentive to control seed sources within the property.
Practicality of targeting beneficiaries	The main beneficiaries are the wider community for biodiversity benefits and this group can be readily target through the General Rate. Land holder benefits can be targeted through direct charges, and the rural community through a targeted rural rate. Levies or rates could be charged against irrigated properties and hydro assets potentially affected the reduction in water associated with wilding spread.
Practicality of targeting exacerbators	Location of wildings can be established through an inspection programme or remote monitoring. Therefore exacerbators are able to be targeted.
Administrative efficiency	General Rate is highly efficient for collecting community benefits related to biodiversity. Rural rate can be targeted to collect benefits from preventing spread and damage to productive values. Targeting irrigated properties and hydro assets would be more problematic than a targeted rural rate and would require a higher standard of consultation and establishment of benefits.
Security	Rating mechanisms are generally secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement.
Reasonable	The costs for wilding control can be extremely high for dense infestations, and typically the cost of control greatly outweighs any production benefits.
Parties bearing indirect costs	Wilding control can cause erosion and landscape impacts.
Transitional cost allocation arrangements	If land holder control is to be required then some transitional mechanisms will be required to ensure that the ongoing costs of control are manageable.
Mechanisms available	General Rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

16.3.3 Proposed allocation of costs

The analysis in Table 31 suggests that cost of control is approximately equal to the production benefits, although the benefits and costs are not equally shared with those currently infested experiencing the costs of control, while those not currently infested would receive benefits from both control costs saved and reduced production losses. The hydro and irrigation benefits are both substantial, and the biodiversity benefits are all a substantial part of the net benefit from the Progressive Containment option. Other benefits are negligible.

The analysis therefore suggests that the cost of the programme should be spread between the landholders who benefit, including those protected from spread, and the wider regional community.

Landholder control (as exacerbators) has the potential to increase the effectiveness of control but it should be kept in mind that for large infestations on high country properties the costs of doing so would be unreasonably large. It is therefore recommended that the costs of large scale control programmes should be funded mostly from the General Rate for reasons of practicality and efficiency. This would target all parties receiving production, hydro, irrigation and biodiversity benefits. Ongoing removal of wildings following effective control should be the role of landholder as exacerbators.

The recommendation for funding is therefore:

- Inspection and monitoring costs: 100% General Rate.
- Initial large scale control: 100% General Rate.
- Ongoing control following initial control: 100% landholder

17 Bomarea

17.1 Description

Bomarea is a shade tolerant, multi-stemmed vine that arises from short underground rhizomes, which bear numerous tubers. It invades alongside streams and river banks, shrublands, forest edges, forest remnants and intact low canopy forest. The vines grow into the forest canopy, forming large masses, which overtop and smother supporting trees. Large infestations can alter light levels in forests, kill mature trees and prevent seedlings from establishing. Bomarea produces bright fleshy orange seeds, which can be dispersed over long distances by birds.

Bomarea is known to be present, or has been present, across 870 properties in Otago, primarily in Dunedin City, Otago Peninsula, and West Harbour areas.

17.2 Proposed Plan

ORC is proposing that Bomarea is controlled through the Progressive Containment objective described in Section 1(b) of the NPD.

17.3 NPD Section 6 Assessment

17.3.1 Level of analysis

The assessed level of analysis for Bomarea under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

17.3.2 Impacts of Bomarea

Bomarea has the potential to cause damage to biodiversity values on stream and river banks, shrublands, forest edges, forest remnants and intact low canopy forest.

17.3.3 Benefits for management of Bomarea

Prevention of damage to biodiversity on an area of 9850 ha after 100 years if the pest is allowed to spread and prevention of future control costs.

17.3.4 Costs of Bomarea Plan

The plan will incur costs of control, inspection and monitoring. These are \$36,000 annually for the plan option. Costs for all three options considered are a NPV of NPV \$100,000 for Sustained Control, NPV \$600,000 for Progressive Containment, and NPV \$900,000 for Eradication (which has a shorter time frame).

17.3.5 Risks of Bomarea Plan

Technical and operational risks: Progressive Containment is technically difficult to achieve, particularly with bird spread seeds.

Implementation and compliance: Ensuring compliance with management regime will be difficult when so many properties are affected and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

17.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Progressive Containment option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below which suggests that the conclusions are robust to changes in individual parameters. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 9850 ha that should be taken into account.

These factors suggest that the Progressive Containment option is strongly favoured as the producing the highest net benefit if the assumptions made in this analysis are considered reasonable.

Table 1: Outcomes of analysis of costs and benefits for Bomarea

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$57,730,000		
Eradication	\$31,370,000	\$26,360,000	\$17,870,000
Progressive Containment	\$12,630,000	\$45,100,000	\$27,920,000
Sustained Control	\$2,040,000	\$55,680,000	\$15,810,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Progressive Containment
Time to full occupation 50% of base	Progressive Containment
Time to full occupation 150% of base	Progressive Containment
Distance of spread 50% of base	Progressive Containment
Distance of spread 200% of base	Progressive Containment
Cost of control +20% from base	Progressive Containment
Cost of control -20% from base	Progressive Containment
Loss of production impacts -20% from base	Progressive Containment
Loss of production impacts +20% from base	Progressive Containment
Discount rate 4%	Progressive Containment
Discount rate 8%	Progressive Containment

17.4 NPD Section 7 - Allocation of Costs and Benefits

17.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Bomarea

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Wider community from prevention of damage to biodiversity values and future control costs.
- Active exacerbators: Any persons transporting Bomarea into or around the region
- Passive exacerbators: Any persons with Bomarea on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Bomarea

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$2,000,000	\$100,000
Progressive Containment	\$13,000,000	\$600,000
Eradication	\$31,000,000	\$900,000

Table 5: Benefits and costs of plan for Bomarea that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Costs for exacerbators
Sustained Control	\$-1,330,000	\$57,000,000	\$2,000,000
Progressive Containment	\$-12,000,000	\$57,000,000	\$13,000,000
Eradication	\$-31,000,000	\$57,000,000	\$31,000,000

17.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Bomarea plan

Legislative rights and responsibilities	None known
Management objectives	Progressive Containment
Stage of infestation	Well established with 870 sites, but mainly in Dunedin and surrounding area..
Most effective control agents	Landholders are most effective because it is too widespread for agency control over the whole affected area.
Urgency	Moderate urgency to prevent spread outside its current main infestation areas.
Efficiency and effectiveness	Across the affected area landholder control is likely to be more effective than the agency attempting to identify and control all sites. However it may require significant inspection and enforcement efforts.
Practicality of targeting beneficiaries	Beneficiaries are the wider community for biodiversity values.
Practicality of targeting exacerbators	Exacerbators can be targeted through inspections, although not all sites may be known.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	For major infestations on private land assistance may be required from the council as costs would be large and significant resistance would be encountered.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

17.4.3 Proposed allocation of costs

The benefits of the plan are largely to the wider community for prevention of damage to biodiversity. The pest is widespread and control being undertaken by landholders will encourage better identification and control of the pest. The proposed allocation of costs is therefore:

- Control costs – landholders with Bomarea on their property as exacerbators. For large infestations on private land council should fund initial control costs through general rate.
- Inspection and monitoring costs – wider community through general rate for prevention of damage to biodiversity values and saved future control costs.

18 Lagarosiphon

18.1 Description

Lagarosiphon is a vigorous submerged bottom rooting aquatic perennial reaching depths of 6.5m. It has slender stems slender, that are brittle and much branched. It occupies and displaces biodiversity in moderately fast flowing to still water bodies of low fertility and high clarity. Only female plants have been collected in New Zealand, so no seed dispersal occurs here. However spreading is through stem fragments that are easily dispersed within catchments by water flow. New catchments are colonised by contaminated boats and trailers (occasionally motor cooling water), eel nets, diggers, people liberating fish, and emptying aquaria.

18.2 Proposed Plan

ORC is proposing that Lagarosiphon is controlled through a Site Led Programme objective described in Section 1(b) of the NPD. The majority of the control work will be undertaken by, and costs will be incurred by, LINZ.

18.3 NPD Section 6 Assessment

18.3.1 Level of analysis

The assessed level of analysis for Lagarosiphon under the requirements of the NPD and using the Guidance approach is Level 2. The detail of the requirement for assessment is shown in Appendix B.

18.3.2 Impacts of Lagarosiphon

Lagarosiphon has the potential to cause damage to biodiversity, recreational activity and amenity values.

18.3.3 Benefits for management of Lagarosiphon

Prevention impacts on biodiversity, recreation and amenity values, on an area of 1150 ha after 100 years if the pest is allowed to spread. Management at current levels will also reduce future control costs.

18.3.4 Costs of Lagarosiphon Plan

The plan will incur costs of control, inspection and monitoring. These are \$32,000 annually for the plan option. Costs for all three options considered are a NPV of NPV \$500,000 for Sustained Control, NPV \$2,000,000 for Progressive Containment, and NPV \$3,000,000 for Eradication.

18.3.5 Risks of Lagarosiphon Plan

Technical and operational risks: Containment and control of Lagarosiphon is difficult, and because of the potential for spread through a number of mechanisms has high risk of non-achievement. Lagarosiphon has been under control around NZ for a long period with limited progress, but has been successfully managed by LINZ in Otago for a number of years.

Implementation and compliance: Ensuring compliance with management regime to prevent spread is difficult because exacerbators who move weed between lakes are difficult to identify.

However LINZ undertakes and funds control work so no compliance problems are expected in that regard.

Other legislative risks: None known

Public or political concerns: None known

Other risks: None known

18.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Do Nothing option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity, recreational and amenity values on 1150 ha of lakes and waterways that should be taken into account.

In order for the proposed plan to be worthwhile there would need to be a benefit associated with preventing damage to biodiversity, recreational, and amenity values of \$19,000/ha in order for the Site Led Programme option to be worthwhile (see Table 2 below).

These factors suggest that either Do Nothing or the Site Led Programme option are favoured as the producing the highest net benefit depending on the value assigned to biodiversity, recreational and amenity values of any water bodies affected by Lagarosiphon.

Table 1: Outcomes of analysis of costs and benefits for Lagarosiphon

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$19,110,000		
Eradication	\$955,530,000	-\$936,420,000	-\$423,470,000
Progressive Containment	\$363,220,000	-\$344,110,000	-\$159,610,000
Site Led Programme	\$57,360,000	-\$38,250,000	-\$21,980,000

Table 2: Value of biodiversity required for option to be positive (negative value shows that option is worthwhile even without biodiversity benefits)

Plan	Value of biodiversity needed for plan to be positive (\$/ha)	Risk adjusted value of biodiversity for plan to be positive (\$/ha)
Eradication	\$181,000	\$82,000
Progressive Containment	\$67,000	\$31,000
Site Led Programme	\$33,000	\$19,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Do Nothing
Time to full occupation 50% of base	Do Nothing
Time to full occupation 150% of base	Do Nothing
Distance of spread 50% of base	Do Nothing
Distance of spread 200% of base	Do Nothing
Cost of control +20% from base	Do Nothing
Cost of control -20% from base	Do Nothing
Loss of production impacts -20% from base	Do Nothing
Loss of production impacts +20% from base	Do Nothing
Discount rate 4%	Do Nothing
Discount rate 8%	Do Nothing

18.4 NPD Section 7 - Allocation of Costs and Benefits

18.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Lagarosiphon

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Wider community from prevention of damage to biodiversity, recreational and amenity values.
- Active exacerbators: Any persons transporting Lagarosiphon into or around the region
- Passive exacerbators: Any persons with Lagarosiphon on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Lagarosiphon

Plan option	Control costs landholders	Inspection and monitoring costs
Site Led Programme	\$57,000,000	\$500,000
Progressive Containment	\$363,000,000	\$2,000,000
Eradication	\$955,000,000	\$3,000,000

Table 5: Benefits and costs of plan for Lagarosiphon that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Required benefit for community for biodiversity and ecological benefits in order for option to be positive	Costs for exacerbators
Site Led Programme	\$-38,000,000	\$0	\$38,250,000	\$57,000,000
Progressive Containment	\$-343,000,000	\$0	\$344,110,000	\$363,000,000
Eradication	\$-936,000,000	\$0	\$936,420,000	\$955,000,000

18.4.2 Matters for consideration in allocation of costs

The Matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 6 below.

Table 6: Matters for consideration in allocating costs for proposed Lagarosiphon plan

Legislative rights and responsibilities	None known
Management objectives	Site Led Programme
Stage of infestation	Is present in 3 main water bodies in Otago but covers a large area.
Most effective control agents	Requires control by council and Crown agencies as public land. Private control is infeasible.
Urgency	Low as has been present for a long time
Efficiency and effectiveness	Council or crown agency will be most effective as control is difficult and requires a range of techniques depending on the situation. Control is currently undertaken by LINZ and this is expected to continue.
Practicality of targeting beneficiaries	Wider community beneficiaries can be targeted through General Rate. LINZ voluntarily undertakes and funds control work.
Practicality of targeting exacerbators	Exacerbators are very difficult to identify as spread is through a variety of mechanisms, and is often unknowingly moved by to the individual transporting it.
Administrative efficiency	General rate is highly efficient for collecting community benefits related to biodiversity.
Security	Rating mechanisms are generally secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	It would be unreasonable to charge any party other than council or LINZ. Even if exacerbators could be identified the costs of cleanup could potentially be very high.
Parties bearing indirect costs	None likely.
Transitional cost allocation arrangements	None required.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms.

18.4.3 Proposed allocation of costs

Lagarosiphon occurs in public space, the benefits are to the wider community for prevention of damage to biodiversity, recreation and amenity values, and exacerbators are difficult to identify. It is most appropriate that the costs of inspection, monitoring and control should be continue to be funded by LINZ with any additional funding sourced from General rate.

19 Broom - Rural

19.1 Proposed Plan

ORC is proposing that Broom is controlled in a rural setting through the Sustained Control objective described in Section 1(b) of the NPD.

19.2 NPD Section 6 Assessment

19.2.1 Level of analysis

The assessed level of analysis for Broom under the requirements of the NPD and using the Guidance approach is Level 2. The detail of the requirement for assessment is shown in Appendix B.

19.2.2 Impacts of Broom

Broom has the potential to cause loss of production from pastoral agriculture in hill and high country. It also causes impacts to biodiversity in tussock landscapes, grasslands and riverbeds.

19.2.3 Benefits for management of Broom

Prevention of loss of production from pastoral agriculture in hill and high country. Impacts to biodiversity in tussock landscapes, grasslands and riverbeds. Net benefits are NPV \$450,000,000 relative to the pest being kept at its current level for those not currently infested.

19.2.4 Costs of Broom Plan

The plan will incur costs of control, inspection and monitoring. These are \$40,000 annually for the plan option. Costs for all three options considered are a NPV of NPV \$700,000 for Sustained Control, NPV \$13,000,000 for Progressive Containment, and NPV \$33,000,000 for Eradication.

19.2.5 Risks of Broom Plan

Technical and operational risks: There is a long history of attempts to control Broom, with little evident impact on a widespread basis. The technical risks of preventing spread for a well established and widespread plant are considerable and there is a low probability of success.

Implementation and compliance: As noted there is a long history of regulated Broom control with widespread non-compliance. The implementation and compliance risks are substantial and the likelihood of anything of significance beyond the Do Nothing scenario in areas where it is already present are minimal.

Other legislative risks: None known

Public or political concerns: High cost and widespread nature of Broom.

Other risks: None known

19.2.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 33 below. In terms of those alternatives considered, the Sustained Control option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 34 below which suggests that it is not affected by

major changes in assumptions. In addition to the quantified costs and benefits, there are potential benefits associated with preventing damage to biodiversity on 302,000 ha that should be taken into account.

These factors suggest that the Sustained Control option is favoured as producing the highest net benefit if the assumptions made in this analysis are considered reasonable. However, the conclusion is dependent on the ability of the Council to prevent spread into uninfested areas, and this is unproven at present.

Table 33: Outcomes of analysis of costs and benefits for Broom

Plan	Total control costs and lost production PV(6%)	Net Benefit of plan NPV(6%)	Risk adjusted net benefit of plan NPV(6%)
Do Nothing	\$1,112,560,000		
Eradication	\$4,153,880,000	-\$3,041,330,000	-\$1,643,440,000
Progressive Containment	\$1,587,940,000	-\$475,380,000	-\$473,790,000
Sustained Control	\$663,450,000	\$449,110,000	\$59,310,000

Table 34: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Sustained Control
Time to full occupation 50% of base	Sustained Control
Time to full occupation 150% of base	Sustained Control
Distance of spread 50% of base	Sustained Control
Distance of spread 200% of base	Sustained Control
Cost of control +20% from base	Sustained Control
Cost of control -20% from base	Sustained Control
Loss of production impacts -20% from base	Sustained Control
Loss of production impacts +20% from base	Sustained Control
Discount rate 4%	Sustained Control
Discount rate 8%	Sustained Control

19.3 NPD Section 7 - Allocation of Costs and Benefits

19.3.1 Beneficiaries, exacerbators and costs of proposed plan for control of Broom

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits. Wider community for biodiversity benefits.

- Active exacerbators: Any persons transporting Broom into or around the region.
- Passive exacerbators: Any persons with Broom on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 35 and Table 36.

Table 35: Direct and indirect costs of plan for Broom

Plan option	Control costs land holders (PV (6%))	Inspection and monitoring costs (PV (6%))
Sustained Control	\$415,000,000	\$700,000
Progressive Containment	\$1,579,000,000	\$13,000,000
Eradication	\$4,154,000,000	\$33,000,000

Table 36: Benefits and costs of plan for Broom that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested (PV (6%))	Benefits for those not currently infested (PV (6%))	Required benefit for community for biodiversity and ecological benefits in order for option to be positive	Costs for exacerbators (PV (6%))
Sustained Control	\$-33,000,000	\$483,000,000		\$415,000,000
Progressive Containment	\$-957,000,000	\$483,000,000	\$475,380,000	\$1,579,000,000
Eradication	\$-3,523,000,000	\$483,000,000	\$3,041,330,000	\$4,154,000,000

19.3.2 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 37 below.

Table 37: Matters for consideration in allocating costs for proposed Broom plan

Legislative rights and responsibilities	None known.
Management objectives	Sustained Control.
Stage of infestation	Widespread.
Most effective control agents	Land holders.
Urgency	Very low - well established and widespread.
Efficiency and effectiveness	The effectiveness of a Sustained Control plan is likely to be moderate, given that past intensive control efforts appear to have had some impact on spread. The efficiency of requiring land holders to control in uneconomic circumstances is likely to be marginal.
Practicality of targeting beneficiaries	Beneficiaries are widespread throughout the region, although largely related to pastoral agriculture.
Practicality of targeting exacerbators	Location of Broom can be established through an inspection programme. Therefore exacerbators are able to be targeted.
Administrative efficiency	General Rate is highly efficient for collecting community benefits related to biodiversity. Targeted rural rate is appropriate and efficient for benefits to pastoral agriculture.
Security	Rating mechanisms are generally secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement.
Reasonable	The costs of the programme are potentially high for some land holders with little benefit received.
Parties bearing indirect costs	No indirect costs are expected.
Transitional cost allocation arrangements	Programmes for Broom control have been established for a long period. No transitional mechanisms are likely to be required.
Mechanisms available	General Rate, targeted rate (rural properties), and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

19.3.3 Proposed allocation of costs

The management of Broom potentially has very high costs associated with it. Care is therefore needed in terms of identifying who should pay for control. The benefits are largely associated with production, although there are benefits for biodiversity in parts of the landscape, particularly high country. The approach to funding recommended here separates out the requirements for funding dependent on where the control is required, and therefore to whom the benefits accrue.

- Inspection and monitoring in hill country and lowland where productive values are concerned – rate targeted at productive rural properties.
- Control in hill country and lowland where productive values are concerned – 100% exacerbators control to prevent spread onto neighbouring properties.
- Inspection and monitoring in high country where biodiversity and productive values are concerned – 50% targeted rural rate, 50% General Rate.
- Initial control in high country where biodiversity and productive values area concerned – control funded 50% General Rate, 50% land holder.
- Ongoing control in high country to prevent recurrence and spread - land holder.

20 Gorse - rural

20.1 Description

Gorse is an erect shrub growing to 5 m in height that was introduced to Otago for use as a fencing shrub and for shelter. Gorse is widespread in Otago, and causes loss of production by excluding stock and displacing pasture. Gorse may also increase costs for establishment of forestry plantings. Gorse is considered a good nursery plant for the regeneration of native forest where a suitable native seed source is available.

20.2 Proposed Plan

ORC is proposing that Gorse is controlled through the Sustained Control objective described in Section 1(b) of the NPD. This analysis assesses the benefits and costs of Gorse control in an urban and rural setting.

20.3 NPD Section 6 Assessment

20.3.1 Level of analysis

The assessed level of analysis for Gorse under the requirements of the NPD and using the Guidance approach is Level 2. The detail of the requirement for assessment is shown in Appendix B.

20.3.2 Impacts of Gorse

Gorse has the potential to cause loss of production from pastoral agriculture in hill and high country.

20.3.3 Benefits for management of Gorse

The quantified benefits from Gorse management are the prevention of loss of production from pastoral agriculture in hill country and prevention of control costs. The costs of lost production and control costs if allowed to spread are NPV(6%) \$438 million for landholders currently not infested.

20.3.4 Costs of Gorse Plan

The plan will incur costs of inspection and monitoring as well as landholder control. Inspection costs are \$40,000 annually for the plan option. Costs for inspection in all three options considered are a NPV of NPV \$700,000 for Sustained Control, NPV \$13,000,000 for Progressive Containment, and NPV \$33,000,000 for Eradication.

20.3.5 Risks of Gorse Plan

Technical and operational risks: There is a long history of attempts to control Gorse, with little evident impact on a widespread basis. The technical risks of preventing spread for a well established and widespread plant are considerable.

Implementation and compliance: There is a long history of regulated Gorse control with widespread non-compliance. The implementation and compliance risks are substantial and the likelihood of additional control beyond the Do Nothing scenario in areas where it is already present are low.

Other legislative risks: None known

Public or political concerns: High cost and widespread nature of Gorse.

Other risks: None known

20.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 38 below. In terms of those alternatives considered, the Sustained Control option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 39 below which suggests that the conclusion is robust to changes in single assumptions.

These factors suggest that the Sustained Control option is favoured as producing the highest net benefit if the assumptions made in this analysis are considered reasonable, provided the plan is able to prevent spread.

Table 38: Outcomes of analysis of costs and benefits for Gorse (rural)

Plan	Total control costs and lost production PV(6%)	Net Benefit of plan NPV(6%)	Risk adjusted net benefit of plan NPV(6%)
Do Nothing	\$1,112,560,000		
Eradication	\$4,153,880,000	-\$3,041,330,000	-\$1,643,440,000
Progressive Containment	\$1,587,940,000	-\$475,380,000	-\$473,790,000
Sustained Control	\$663,450,000	\$449,110,000	\$59,310,000

Table 39: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Sustained Control
Time to full occupation 50% of base	Sustained Control
Time to full occupation 150% of base	Sustained Control
Distance of spread 50% of base	Sustained Control
Distance of spread 200% of base	Sustained Control
Cost of control +20% from base	Sustained Control
Cost of control -20% from base	Sustained Control
Loss of production impacts -20% from base	Sustained Control
Loss of production impacts +20% from base	Sustained Control
Discount rate 4%	Sustained Control
Discount rate 8%	Sustained Control

20.4 NPD Section 7 - Allocation of Costs and Benefits

20.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Gorse

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits.
- Active exacerbators: Any persons transporting Gorse into or around the region.
- Passive exacerbators: Any persons with Gorse on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 40 and Table 41.

Table 40: Direct and indirect costs of plan for Gorse

Plan option	Control costs land holders (PV (6%))	Inspection and monitoring costs (PV (6%))
Sustained Control	\$415,000,000	\$700,000
Progressive Containment	\$1,579,000,000	\$13,000,000
Eradication	\$4,154,000,000	\$33,000,000

Table 41: Benefits and costs of plan for Gorse that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested (PV (6%))	Benefits for those not currently infested (PV (6%))	Costs for exacerbators (PV (6%))
Sustained Control	\$-33,000,000	\$483,000,000	\$415,000,000
Progressive Containment	\$-958,000,000	\$483,000,000	\$1,579,000,000
Eradication	\$-3,520,000,000	\$483,000,000	\$4,154,000,000

20.4.2 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown Table 42.

Table 42: Matters for consideration in allocating costs for proposed Gorse (rural) plan

Legislative rights and responsibilities	None known.
Management objectives	Sustained Control.
Stage of infestation	Widespread.
Most effective control agents	Land holders.
Urgency	Very low - well established and widespread.
Efficiency and effectiveness	The effectiveness of a Sustained Control plan is likely to be moderate, given that past intensive control efforts appear to have had some impact on spread. The efficiency of requiring land holders to control in uneconomic circumstances is likely to be low.
Practicality of targeting beneficiaries	Beneficiaries are widespread throughout the region, although largely related to pastoral agriculture.
Practicality of targeting exacerbators	Location of gorse can be established through an inspection programme. Therefore exacerbators are able to be targeted.
Administrative efficiency	Targeted rural rate is appropriate and efficient for benefits to pastoral agriculture.
Security	Rating mechanisms are generally secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement.
Reasonable	The costs of the programme are potentially high for some land holders with little benefit received.
Parties bearing indirect costs	No indirect costs are expected.
Transitional cost allocation arrangements	Programmes for gorse control have been established for a long period. No transitional mechanisms are likely to be required.
Mechanisms available	General Rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

20.4.3 Proposed allocation of costs

The control of gorse primarily provides production benefits, and the prevention of any spread is of benefit to the rural land. Therefore, rural land holders should bear the majority of any costs. Because land holders are able to determine whether control is worthwhile on their own property, in the absence of any wider benefit the major gains will come from preventing spread. Therefore, the recommendations for funding are:

- Inspection and monitoring costs to prevent spread onto neighbouring properties – 100% targeted rate on rural productive land.
- Control costs to prevent spread – 100% land holders as exacerbators.

21 Nodding Thistle

21.1 Description

Nodding Thistle (*Carduus nutans*) is an upright thistle. It invades crop land, pasture, and non productive areas, and occurs in a number of locations in Otago. It prevents stock movement, competes with pasture species, causes injuries to the mouths and eyes of stock, and contaminates wool. The seed is windblown but it can also be spread by stock, water, vehicles, and in dirt.

21.2 Proposed Plan

ORC is proposing that Nodding Thistle is controlled through the Sustained Control objective described in Section 1(b) of the NPD.

21.3 NPD Section 6 Assessment

21.3.1 Level of analysis

The assessed level of analysis for Nodding Thistle under the requirements of the NPD and using the Guidance approach is Level 2. The detail of the requirement for assessment is shown in Appendix B. Note that this analysis tests a plan that prevents the further spread of Nodding thistle through boundary control.

21.3.2 Impacts of Nodding Thistle

Nodding Thistle has the potential to cause loss of production from pastoral agriculture in hill and high country.

21.3.3 Benefits for management of Nodding Thistle

Benefits from the management of Nodding Thistle accrue from the prevention of loss of production from pastoral agriculture in hill and high country. Cost of control and lost production if allowed to spread are NPV(6%) \$22,000,000 for those not currently infested.

21.3.4 Costs of Nodding Thistle Plan

The plan will incur costs of inspection, and monitoring. These are \$7500 annually for the plan option. Costs for all three options considered are an NPV(6%) of \$100,000 for Sustained Control, NPV(6%) \$2,000,000 for Progressive Containment, and NPV(6%) \$6,000,000 for Eradication.

21.3.5 Risks of Nodding Thistle Plan

Technical and operational risks: Sustained Control has relatively few risks, although Nodding Thistle has been under control for a long period with limited progress and the likelihood of having any significant impact appears limited.

Implementation and compliance: Ensuring compliance with management regime will be difficult and will require education, inspection and potentially enforcement. These all carry risks.

Other legislative risks: None known

Public or political concerns: Spread of Nodding thistle on riverbeds is a public concern.

Other risks: None known

21.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 43 below. In terms of those alternatives considered, the Sustained Control option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 44 below which suggests the conclusion is reasonably robust under changes to a range of assumptions, although it is sensitive to no longer being worthwhile to undertake under assumptions of a lower distance of spread, lower costs of control, and a high discount rate.

These factors suggest that the Sustained Control option has the highest net benefit if the assumptions made in this analysis are considered reasonable.

Table 43: Outcomes of analysis of costs and benefits for Nodding thistle.

Plan	Total control costs and lost production PV(6%)	Net Benefit of plan NPV(6%)	Risk adjusted net benefit of plan NPV(6%)
Do Nothing	\$116,690,000		
Eradication	\$415,600,000	-\$298,900,000	-\$172,580,000
Progressive Containment	\$152,370,000	-\$35,680,000	-\$52,840,000
Sustained Control	\$93,010,000	\$23,680,000	\$1,630,000

Table 44: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Sustained Control
Time to full occupation 50% of base	Sustained Control
Time to full occupation 150% of base	Sustained Control
Distance of spread 50% of base	Do Nothing
Distance of spread 200% of base	Sustained Control
Cost of control +20% from base	Sustained Control
Cost of control -20% from base	Do Nothing
Loss of production impacts -20% from base	Sustained Control
Loss of production impacts +20% from base	Sustained Control
Discount rate 4%	Sustained Control
Discount rate 8%	Do Nothing

21.4 NPD Section 7 - Allocation of Costs and Benefits

21.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Nodding Thistle

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: Rural community from prevention of spread and production benefits.
- Active exacerbators: Any persons transporting Nodding Thistle into or around the region.
- Passive exacerbators: Any persons with Nodding Thistle on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 45 and Table 46.

Table 45: Direct and indirect costs of plan for Nodding Thistle

Plan option	Control costs land holders (PV (6%))	Inspection and monitoring costs (PV (6%))
Sustained Control	\$42,000,000	\$100,000
Progressive Containment	\$149,000,000	\$2,000,000
Eradication	\$415,000,000	\$6,000,000

Table 46: Benefits and costs of plan for Nodding Thistle that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested (PV (6%))	Benefits for those not currently infested (PV (6%))	Costs for exacerbators (PV (6%))
Sustained Control	\$1,980,000	\$22,000,000	\$42,000,000
Progressive Containment	\$-57,000,000	\$22,000,000	\$149,000,000
Eradication	\$-320,000,000	\$22,000,000	\$415,000,000

21.4.2 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 47 below.

Table 47: Matters for consideration in allocating costs for proposed Nodding Thistle plan

Legislative rights and responsibilities	None known
Management objectives	Sustained Control
Stage of infestation	Late stage – nodding thistle is throughout Otago
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Low urgency as it has been present for a long time and has likely reached most of Otago.
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Nodding thistle is easily seen and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for Nodding thistle for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

21.4.3 Proposed allocation of costs

The recommended approach is for a mix of land holder control as exacerbators and a targeted rate for productive land in the wider community for inspection, monitoring, and enforcement costs.

- Inspection and monitoring costs: 100% targeted rate on productive rural land as beneficiaries
- Control costs: 100% land holders as exacerbators

22 Ragwort

22.1 Description

Ragwort (*Jacobaea vulgaris*) is a biennial or perennial herb that grows 30 – 120cm tall, with an erect rigid stem and yellow daisy like flowers. It is wind spread and produces a very large number of long lived seed that can colonise bare ground rapidly. Ragwort invades disturbed forest and shrubland, short tussockland, fernland, herbfield, wetlands and coastal areas throughout New Zealand. In a productive setting it is usually considered a pest only of dairying because it is palatable to sheep. It taints milk if eaten by lactating cows.

22.2 Proposed Plan

ORC is proposing that Ragwort is controlled through the Sustained Control objective described in Section 1(b) of the NPD.

22.3 NPD Section 6 Assessment

22.3.1 Level of analysis

The assessed level of analysis for Ragwort under the requirements of the NPD and using the Guidance approach is Level 2. The detail of the requirement for assessment is shown in Appendix B.

22.3.2 Impacts of Ragwort

Ragwort has the potential to cause loss of production on dairy farms as its major impact.

22.3.3 Benefits for management of Ragwort

Prevention of loss of production on dairy farms. There is a negative net benefit relative to the pest being kept at its current level, primarily because effective control will require its removal on properties where it is not currently a major pest.

22.3.4 Costs of Ragwort Plan

The plan will incur costs of control, inspection and monitoring. These are \$5000 annually for the plan option. Costs for all three options considered are a NPV of NPV \$80,000 for Sustained Control, NPV \$2,000,000 for Progressive Containment, and NPV \$4,000,000 for Eradication.

22.3.5 Risks of Ragwort Plan

Technical and operational risks: Ragwort has been present in New Zealand for many years, and it likely to have occupied most habitats in Otago. No progress has been made in reducing ragwort infestations anywhere in New Zealand under a RPMP, and given the number of viable seeds produces and its wide potential dispersal it is unlikely that intervention by the regional council will make any difference to the infestation on individual properties.

Implementation and compliance: Because of the widespread nature of ragwort in order to achieve uniform compliance there would need to be a very large inspection programme, with regular follow ups through the season.

Other legislative risks: None known.

Public or political concerns: Ragwort is highly visible in flower and can be the cause of concern for those landholders who consider they are affected by infestations on a neighbouring property.

Other risks: There is a biocontrol agent released for ragwort. Care should be taken to ensure that any control requirements do not interfere with establishment and spread of other biocontrol agents that may be released in the future.

22.3.6 Net Benefit and risk adjustment

The analysis produces an estimate of the total costs and benefits of the different options for the plan, as shown in Table 1 below. In terms of those alternatives considered, the Sustained Control option has the highest net value. The sensitivity of this conclusion to changes in various input parameters is shown in Table 3 below, which suggests that Do Nothing may be of a higher net benefit with a lower discount rate or higher rates of spread.

These factors suggest that a plan for control of ragwort is unlikely to meet the tests of the Biosecurity Act if the assumptions made in this analysis are considered reasonable.

Table 1: Outcomes of analysis of costs and benefits for Ragwort

Plan	Total NPV	Net Benefit of plan	Risk adjusted net benefit
Do Nothing	\$754,680,000		
Eradication	\$997,030,000	-\$242,350,000	-\$344,290,000
Progressive Containment	\$381,210,000	\$373,480,000	-\$67,390,000
Sustained Control	\$332,370,000	\$422,310,000	\$76,540,000

Table 3: Impact of sensitivity testing on highest value option

Sensitivity test	Highest value option (risk adjusted)
Base net benefit	Sustained Control
Time to full occupation 50% of base	Do Nothing
Time to full occupation 150% of base	Sustained Control
Distance of spread 50% of base	Sustained Control
Distance of spread 200% of base	Sustained Control
Cost of control +20% from base	Sustained Control
Cost of control -20% from base	Sustained Control
Loss of production impacts -20% from base	Sustained Control
Loss of production impacts +20% from base	Sustained Control
Discount rate 4%	Sustained Control
Discount rate 8%	Sustained Control

22.4 NPD Section 7 - Allocation of Costs and Benefits

22.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Ragwort

The beneficiaries and exacerbators of the plan are:

- Beneficiaries:
- Active exacerbators: Any persons transporting Ragwort into or around the region
- Passive exacerbators: Any persons with Ragwort on their property not undertaking control.

The direct and indirect costs associated with the plan are shown below in Table 4 and Table 5.

Table 4: Direct and indirect costs of plan for Ragwort

Plan option	Control costs landholders	Inspection and monitoring costs
Sustained Control	\$60,000,000	\$80,000
Progressive Containment	\$379,000,000	\$2,000,000
Eradication	\$997,000,000	\$4,000,000

Table 5: Benefits and costs of plan for Ragwort that accrue to different beneficiaries and exacerbators

Plan option	Benefits for those currently infested	Benefits for those not currently infested	Required benefit for community for biodiversity and ecological benefits in order for option to be positive	Costs for exacerbators
Sustained Control	\$20950000	\$401000000	\$-422310000	\$60000000
Progressive Containment	\$-28228271	\$401000000	\$-373480000	\$379000000
Eradication	\$-643559162	\$401000000	\$242350000	\$997000000

22.4.2 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 48 below.

Table 48: Matters for consideration in allocating costs for proposed Ragwort plan

Legislative rights and responsibilities	None known
Management objectives	Sustained Control
Stage of infestation	Late stage – ragwort is throughout Otago
Most effective control agents	Landholders are most effective because it requires control and measures to ensure that seed does not spread.
Urgency	Low urgency as it has been present for a long time and has likely reached its full habitat
Efficiency and effectiveness	It is likely that requiring landholders to control will improve the efficiency of control measures as land will be managed to reduce infestation and spread.
Practicality of targeting beneficiaries	Beneficiaries are the wider rural community for prevention of spread onto productive land.
Practicality of targeting exacerbators	Ragwort in flower is easily seen and exacerbators can be targeted.
Administrative efficiency	Exacerbators control requires inspection and enforcement, while general rate would have greater administrative efficiency
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required as control has been required for ragwort for some time.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

22.4.3 Proposed allocation of costs

The recommended approach is for a mix of land holder control as exacerbators and a targeted rate for productive land in the wider community for inspection, monitoring, and enforcement costs.

- Inspection and monitoring costs: 100% targeted rate on productive rural land as beneficiaries. A levy on dairy properties could be considered, although this is not likely to be an efficient mechanism for collection of funding requirements.
- Control costs: 100% land holders as exacerbators

23 Russell Lupin

23.1 Description

Russell lupin (*Lupinus polyphyllus*) is a biennial or perennial herb that produces an erect 15 – 60cm long flowerhead spike. It tolerates wind, warm to cold, damage and grazing (not readily eaten), flooding and drought, poor soils, low fertility (fixes nitrogen), and fire, but is intolerant of moderate shade. Russell lupin invades shingly braided river systems and provides hiding places for predators of the birds that would usually nest safely on these bare islands. It produces large amounts of seed that are spread mainly by water, and also by humans distributing them along roadsides. Russell lupin is cropped for animal feed in drier high country parts of the region, and is considered a good alternative to lucerne because of its greater tolerance of aluminium toxicity.

23.2 Proposed Plan

ORC is proposing that Russell lupin is controlled through the Sustained Control objective described in Section 1(b) of the NPD. This will involve prevention of planting and occupation by Russell lupin within:

- 200 metres of the outer gravel margin of a braided river;
- 50 metres from any non-braided river;
- 10 metres from any artificial watercourse; or
- 10 metres from an adjoining property boundary.

23.3 NPD Section 6 Assessment

23.3.1 Level of analysis

The assessed level of analysis for Russell lupin under the requirements of the NPD and using the Guidance approach is Level 1. The detail of the requirement for assessment is shown in Appendix B.

23.3.2 Impacts of Russell lupin

Russell lupin has the potential to cause damage to biodiversity values in braided riverbeds, and to impact on flow in waterways with dense infestations.

23.3.3 Benefits for management of Russell lupin

Prevention of loss of biodiversity damage on braided riverbeds and maintaining flows in waterways.

23.3.4 Costs of Russell lupin Plan

The plan will incur costs of control, inspection and monitoring. These are \$10,000 annually for the plan option.

23.3.5 Risks of Russell lupin Plan

Technical and operational risks: Russell lupin is present in many parts of the region and would be difficult to eradicate or remove. Prevention of spread into waterways will be difficult.

Implementation and compliance: Because Russell lupin has productive benefits it is likely to be difficult to completely eliminate it from risk areas. There would be significant effort in inspecting all properties to ensure compliance with the planting prohibitions in the plan, and there will therefore will need to be some reliance on voluntary compliance and complaints.

Other legislative risks: None known.

Public or political concerns: Russell lupin is highly visible and considered attractive in flower and can be seen as having amenity values, particularly along roadsides.

Other risks: None known.

23.3.6 Net Benefit

Data is not available on the extent of planting of Russell lupin and how significant the costs of preventing planting and requiring control adjacent to waterways could be. There are likely to be some costs associated with the unavailability of land adjacent to waterways for planting, particularly with the large setbacks for braided riverbeds and non braided rivers (50m). For example a 10ha paddock with a non braided river adjacent to it would lose 15% of the plantable area, and 75% of the plantable area if it was adjacent to a braided river.

However it is likely that on larger high country properties where Russell lupin cropping is most common there are generally a number of paddocks available which have no permanent waterways adjacent and which are suitable for cropping with Russell lupins. For these properties the plan rules will impose some inconvenience in terms of selecting paddocks for cropping with Russell lupins, but will not impose significant costs overall. However for properties with limited land available for planting and only adjacent to waterways, the costs could be significant. However there are other feed crops available to plant, and these alternatives will mean that costs are not prohibitive.

The costs of control however are likely to be more significant and ongoing. Because of the unknown extent of Russell lupin, it is not possible to calculate a cost for this. Costs are unlikely to be major in grazed areas, because Russell lupin is palatable to animals. However in retired land and waste areas the costs may be significant.

The costs of inspection and monitoring will amount to \$10,000 per annum or NPV (6%) of \$160,000.

It is not possible to provide a definitive answer on whether the benefits outweigh the costs because neither the benefits nor the costs can be accurately specified. If the council considers that the benefits of preventing damage to biodiversity values on riverbeds from Russell lupin exceeds the costs of \$160,000 plus the costs to landholders from reduced availability of land for cropping of this species and costs of control on non-productive land adjacent to waterways, then the benefits will outweigh the costs.

23.4 NPD Section 7 - Allocation of Costs and Benefits

23.4.1 Beneficiaries, exacerbators and costs of proposed plan for control of Russell lupin

The beneficiaries and exacerbators of the plan are:

- Beneficiaries: wider community from prevention of damage to biodiversity values.

- Active exacerbators: persons planting Russell lupin.
- Passive exacerbators: persons not undertaking control of Russell lupins on land adjacent to waterways.

The direct costs of the plan are inspection and monitoring costs of NPV (6%) \$160,000 and costs for unavailability of land for planting.

The benefits are from prevention of damage to biodiversity values and maintenance of waterways, which accrue to the wider community.

23.4.2 Matters for consideration in allocation of costs

The matters for consideration are spelt out in Section 7(2)(d) of the NPD, and the analysis for each of these matters is shown in Table 50 below.

Table 49: Matters for consideration in allocating costs for proposed Russell lupin plan

Legislative rights and responsibilities	None known
Management objectives	Sustained Control
Stage of infestation	Late stage – Russell lupin is throughout Otago
Most effective control agents	Landholders are most effective because it requires measures to ensure that seed does not spread.
Urgency	Low urgency as it has been present for a long time
Efficiency and effectiveness	Landholders are the only party able to prevent planting on their land and likely to be most efficient in ensuring Russell lupin does not become established on their land.
Practicality of targeting beneficiaries	Beneficiaries are the wider rural community for prevention of damage to biodiversity values
Practicality of targeting exacerbators	Russell lupin in flower is easily seen and exacerbators can be targeted.
Administrative efficiency	Exacerbators are the only party able to prevent planting and can be targeted.
Security	Rating mechanisms are most secure.
Fairness	Charges relate directly to benefits or exacerbators. Fairness is a politically determined judgement
Reasonable	Costs are likely to be low overall but may be significant on some properties.
Parties bearing indirect costs	None likely
Transitional cost allocation arrangements	None required in relation to planting as costs are experienced from unavailability of land for planting. However some assistance with control on non-productive land may be appropriate.
Mechanisms available	General rate, targeted rate (rural properties) and direct charges are the most readily available mechanisms. Levies are expensive to establish and administer.

23.4.3 Proposed allocation of costs

The recommended approach is for funding of the inspection and monitoring costs from general rate to reflect the benefits for biodiversity values. Costs of control on productive land are most appropriately targeted at exacerbators. For non productive land additional funding from the wider community may be appropriate to reflect the benefits from prevention of damage to biodiversity.

24 Exclusion Pests

Exclusion pests include :

Table 50: Pests to be included in an exclusion programmes

Common names	Scientific name
African feather grass	<i>Pennisetum macrourum</i>
Chilean needle grass	<i>Nassella neesiana</i>
False tamarisk	<i>Myricaria germanica</i>
Moth plant	<i>Araujia hortorum</i>

24.1 The total expenditure on these pests is expected to be \$10,000 per annum. NPD Section 6 Assessment

The analysis for these pests is undertaken at Level 1 because they are not present in the region, there is no opposition to their management, and the management costs are low.

The objectives for exclusion pests will meet the requirements of Section 6 if the Council considers that there are benefits of reducing the risks of these pests being introduced to the region and causing damage to biodiversity, conservation, amenity, and production values (because no costs are anticipated).

24.2 NPD Section 7 Assessment for Exclusion Pests

Because these pests are not present there are no exacerbators, and therefore the most appropriate source of funding is from the beneficiaries. Rating is the most efficient and secure source of funding. The pests are a mix of production and biodiversity pests. However funding from the General Rate is most appropriate because of the low level of costs involved, and the difficulty of dividing into the expenditure on different pests. There is unlikely to be major efficiency benefits from targeting production beneficiaries, given the diffuse and uncertain nature of the benefits, and therefore the recommendation is that all the funding for Exclusion pests be sourced from General Rate.

25 Site Led Pests

The group of pests included in Site Led programmes are:

Table 51: Pests included in site-led programmes

Common name	Scientific name	Otago Peninsula	Orokonui Halo	Quarantine and Goat Islands	Lagarosiphon Management Areas
Plants					
Banana passionfruit	<i>Passiflora tripartita</i> var <i>mollissima</i> <i>P. tripartita</i> var <i>azuayansis</i> <i>P. tarminiana</i> <i>P. pinnatistipula</i> <i>Passiflora x rosea</i> <i>P. caerulea</i>	*	*		
Chilean flame creeper	<i>Tropaeolum speciosum</i>	*	*		
Darwin's barberry	<i>Berberis darwinii</i>	*	*		
Sycamore	<i>Acer pseudoplatanus</i>	*			
Tradescantia (wandering willie)	<i>Tradescantia fluminensis</i>	*	*		
Lagarosiphon	<i>Lagarosiphon major</i>				*
Animals					
Bennett's wallaby	<i>Macropus rufogriseus rufogriseus</i>	*	*	*	
Feral cat	<i>Felis catus</i>	*	*	*	
Feral deer (incl. hybrids)	<i>Cervus elaphus</i> , <i>C. nippon</i> , <i>C. dama</i>	*	*	*	
Feral goat	<i>Capra aegagrus hircus</i>	*	*	*	
Feral pig	<i>Sus scrofa</i>	*	*	*	
Hedgehog	<i>Erinaceus europaeus</i>	*			
Mustelids (ferret, stoat, weasel)	<i>Mustelo furo</i> , <i>M. ermine</i> , <i>M. nivalis</i>	*	*	*	
Possum	<i>Trichosurus vulpecula</i>	*	*	*	
Rat (Norway, ship and Kiore)	<i>Rattus norvegicus</i> , <i>R. rattus</i> <i>R. exulans</i>			*	

The Site Led status is for these pests relates to specific areas where conservation and biodiversity objectives are targeted. Site led programmes will only be undertaken where there is land holder agreement. Any cost sharing arrangements and ongoing obligations for land holders will be part of the agreement.

25.1 Section 6 Assessment

The level of analysis for Site led Pests is 1, because the expenditure on any single site will be limited, and because the programme will only be undertaken where feasible and in conjunction with the land holder.

The proposed costs for the Site Led Programme pests are approximately \$95,000. The Site-Led Programmes are undertaken in a collaborative nature and intended to support and build on momentum from existing efforts to manage pests for biodiversity protection. The exact nature of the work is to be determined in association with community groups and landholders,

and that agreement will include cost sharing arrangements. The agreement of the community groups and land holders signals that for them the benefits of the programme are likely to exceed the costs they will incur. Therefore, as long as the Council is satisfied that the benefits to the council and the wider community of the site led programme exceed the costs, the requirements of Section 6 of the NPD will have been met.

25.2 Section 7 Assessment

The cost sharing arrangements will be agreed at the time when specific sites are identified. However, because the benefits for the Councils are primarily to biodiversity, it is appropriate that the Council's contribution be covered from the General Rate which reflects the community nature of the benefits.

26 Good Neighbour Rules (GNR)

The good neighbour rule is covered by Section 8 of the NPD. These require that the:

- Pest would spread onto adjacent land;
- That the pest would cause unreasonable costs for the adjacent land holder (receptor);
- The receptor land holder is controlling the pest;
- The requirement on the land holder from whence the pest (source) is spreading is not more than is required to prevent the pest spreading;
- The costs of compliance for the source land holder are reasonable relative to the cost that the receptor land holder would incur from the pest spreading.

The first two of these are covered by the plan requirements and identification of the biology of the pest species, which all spread naturally in the absence of intervention and cause control costs. For each of the pests for which a GNR rule would apply a primary analysis of costs and benefits has already been undertaken. This GNR analysis therefore focuses on whether the costs for the source land holder are reasonable relative to the costs caused by the spread of the pest in the absence of the rule. These GNRs apply in addition to the rules for management in the proposed programmes for feral rabbits, gorse, broom, nodding thistle, ragwort and wilding conifers.

The GNR analysis is undertaken using the model developed for the joint Biosecurity Managers Group as described by Harris, Hutchison, Sullivan, and Bourdot (2016). The model provides a tabular output describing the boundary distance required before the benefits outweigh the costs, and the relationship between the costs for the source and receptor land holders. These are given in Appendix D to assist and inform any decisions as to whether the rule is reasonable as per the requirements of clause 8(1)(e)(ii) of the NPD.

26.1 Feral rabbits

The analysis for feral rabbits in Section 2 shows that overall there is likely to be a net benefit from control of rabbits at or below Maclean's Scale 3. In terms of reasonableness the analysis suggests that the costs are likely to be similar or lower for the source landholder as opposed

to the receptor landholder where the rabbit proneness is moderate or low and the receptor is of a higher proneness class. Requiring control on land where the source is High proneness will result in the costs of the source being between 1.5 and 10 times the additional costs of control for the receptor landholder. Costs are unlikely to be reasonable in any situations where the receptor is Low country because the costs for managing rabbits with spillover is lower on that land type than it is on other steeper land, and because the removal of spillover does not completely remove costs for the receptor landholders. Thus the costs for the source landholder are generally significantly greater than any savings made on low country from preventing spillover.

26.2 Nodding thistle

For light infestations of nodding thistle on hill and high country sheep and beef properties the costs of control for the source and receptor land holders are likely to be similar. The requirement for a GNR is therefore likely to meet the reasonable tests of the NPD. Very dense infestations on boundaries are relatively rare and have not been tested here.

26.3 Gorse

For light infestations of Gorse in the source property, the costs of control for the source and receptor land holders are likely to be similar for hill and high country sheep and beef. For dense infestations the cost of control for source land holders exceeds the costs for the receptor landholder by more than 50%. Decision makers will need to determine whether this is reasonable in the context of the requirements of the NPD.

26.4 Broom

For light infestations of Broom in the source property, the costs of control for the source and receptor land holders are likely to be similar for hill and high country sheep and beef. For dense infestations the cost of control for source land holders exceeds the costs from spread for the receptor landholder by more than 50%. Decision makers will need to determine whether this is reasonable in the context of the requirements of the NPD.

26.5 Wilding conifers

Wilding conifers refer to a range of species. For light infestations of wilding conifers on the source property, the costs of control for the source and receptor land holders are likely to be similar for hill and high country sheep and beef, and for conservation land. In these situations the GNR rule will meet the reasonableness test of the NPD. For dense infestations on the source property the costs of control for the source are 8 – 9 times the additional cost caused by the spread to the adjacent receiving landholder and the GNR inclusion is not likely to meet the reasonableness tests of the NPD.

26.6 Ragwort

For light infestations and where the receptor land use is dairy, the costs of control of ragwort are likely to be similar on both the receptor and source properties, and the GNR would meet the reasonableness test of the NPD. However where the receptor is other land use types these tests are not likely to be met. Very dense infestations of ragwort are rare and have not been tested here.

27 References

- Harris, S. 2016.** *Cost benefit analysis of options for pest management in Canterbury.* Christchurch : LWP Ltd contract report prepared for Environment Canterbury, 2016.
- Harris, S, et al. 2016.** *Economic Assessment of Good Neighbour Rules under the National Policy Direction for Pest Management 2015.* Christchurch : LWP Ltd Contract Report LWP-2016-014, 2016.
- Harris, S. 2014.** *Lower Waitaki Plan Change: Economic impacts of flow changes.* s.l. : Harris Consulting Contract report, May 2014 prepared for Environment Canterbury, 2014.
- Kerr, G N and Sharp, B M.H. 2007.** *The Impact of Wilding Trees on Indigenous Biodiversity: A Choice Modelling Study.* Lincoln : Lincoln University Research Report No 303, 2007.
- Latham, A D. M, Latham, M C and Warburton, B. 2016.** *Review of current and future predicted distributions and impacts of Bennett's and dama wallabies in mainland New Zealand.* Wellington : MPI Technical Paper No 2016/15, 2016.
- NPCA. 2015.** *PEST ROOKS MONITORING AND CONTROL.* Wellington : NPCA, 2015. ISBN: 978-1-877474-64-4.
- Ogle, G. 2014.** *Calculation of Nitrogen and Phosphorous losses to groundwater and waterways from farm systems in the Upper Waitaki.* s.l. : Ogle Consulting report prepared for Environment Canterbury., 2014.
- Patterson, M G and Cole, A O. 2013.** *'Total economic value' of New Zealand's land based ecosystems and their services.* In:Dymond J.R. ed. *Ecosystem Services in New Zealand - conditions and trends.* Lincoln : Manaaki Whenua Press. pp 496 - 510, 2013.
- Spurr, E B and Coleman, J. 2005.** *Review of Canada goose population trends, damage, and control in New Zealand.* Lincoln : Landcare Research Science Series. 30. Manaaki Whenua Press. 1-31 p. ., 2005.
- Taylor, N, et al. 2015.** *Upper Waitaki Limit Setting Process: Social-Economic Profile of the Waitaki catchment.* s.l. : Environment Canterbury
http://files.ecan.govt.nz/public/pc5/Waitaki_Technical_Reports/Social-economic_profile_of_the_Waitaki_catchment.pdf, 2015.
- Velarde, S J, et al. 2015.** *Cost benefit analysis of wilding conifer management in New Zealand. Part 1 - Impacts under current management.* Rotorua : Scion S0013
http://www.wildingconifers.org.nz/images/wilding/articles/Strategy/CBA_Wilding_Conifers_Final.pdf, 2015.
- White, E G. 2006.** *Canada Geese in New Zealand.* Lincoln : Information Paper No.4, Centre for Resource Management, Lincoln University and University of Canterbury, 2006.
- Win, A. 2001.** *Seasonal grazing of Canada goose (Branta canadensis) on high country farmland, Canterbury, New Zealand.* Lincoln : MSc thesis, Lincoln University, 2001.

28 Appendices

Appendix A Assumptions used in plant pest modelling

Table 52: Assumptions for Plant Pest Spread Model (PPSM) Part A

Pest	Programme	Current Area infested (ha)	Number of active sites (locations)	Largest area of a location	Potential habitat/area (ha)	Current densities (%)	Density at full occupancy (%)	Time of first arrival at a site to 90% occupancy at a	Low distance of spread (Min)	High distance of spread (Max)	How often is it likely to generate new foci of	Cost of control low density (\$/ha/annum)	Cost of control high density (\$/ha)	Inspection costs (\$/annum)
Spiny Broom	Eradication	9	3	5	381,424	0.001	15	15	15	50	15	\$100	\$1,000	\$1,500
African Feather Grass	Eradication	0.0001	1	0.0001	342948	0.0001	25	30	500	1500	2	\$5	\$15	\$0
Chilean needle grass	Eradication	0.0001	1	0.0001	342948	0.0001	50	30	15	30	1.2	\$140	\$1,000	\$0
Moth Plant	Eradication	0.0001	1	0.0001	342948	0.0001	50.00	15	1	100	1	\$23	\$45	\$0
African Love Grass	Progressive Containment	200	20	40	342948	0.001	25	30	500	1500	3	\$5	\$15	\$4,500
Boneseed	Progressive Containment	300	48	12	313244	5	50	30	1	2	10	\$45	\$1,000	\$6,500
Bur Daisy	Progressive Containment	10	1	10	50000	5	5.835	30	500	1500	1	\$10	\$45	\$1,800
Cape Ivy	Progressive Containment	20	60	1	51724	0.001	10	30	20	2000	3	100	750	4500
Nassella Tussock	Progressive Containment	98600	3	64000	1461492	1	50	30	1000	10000	10	\$10	\$45	\$45,000
Old Mans Beard	Progressive Containment	10000	2410	120	511204	5	15	30	20	2000	10	45	1000	130000
Perennial Nettle	Progressive Containment	150	15	25	335220	0.001	25	50	1	50	20	100	1000	2500
Spartina	Progressive Containment	1000	6	700	2448	10	30	3	1	3000	1	250	2000	17660
White-edged nightshade	Progressive Containment	20	1	20	333600	0.001	24.25	15	10	50	5	\$10	\$45	\$500

Pest	Programme	Current Area infested (ha)	Number of active sites (locations)	Largest area of a location	Potential habitat/area (ha)	Current densities (%)	Density at full occupancy (%)	Time of first arrival at a site to 90% occupancy at a	Low distance of spread (Min)	High distance of spread (Max)	How often is it likely to generate new foci of	Cost of control low density (\$/ha/annum)	Cost of control high density (\$/ha)	Inspection costs (\$/annum)
Wilding conifers	Progressive Containment	1000000	7	240000	1091212	15	80	20	340	340	3	\$10	\$2,200	\$120,000
Bomarea	Progressive Containment	800	870	131	73612	5	15	30	1	5000	2	500	1000	36000
Lagarosiphon	Sustained Control	11500	3	3500	7980	5	50	30	1	300000	1	1000	10000	32000
Broom Rural	Sustained Control	500000	50000	400000	1029444	15	50	15	10	50	1	\$100	\$1,000	\$40,000
Broom Urban	Sustained Control	994	3373	15	5945	10	50	15	10	50	1	\$100	\$1,000	\$33,730
Gorse Rural	Sustained Control	500000	50000	400000	1029444	15	50	15	10	50	1	\$100	\$1,000	\$40,000
Gorse Urban	Sustained Control	993	3368	15	5945	10	50	15	10	50	1	\$100	\$1,000	\$33,680
Nodding Thistle	Sustained Control	500000	4	359045	1224656	5	6.44	5	50	200	3	\$10	\$45	\$7,500
Ragwort	Sustained Control	100000	3750	250	465092	10	80	5	1	20	3	\$120	\$150	\$5,000

Table 53: Assumptions for Plant Pest Spread Model (PPSM) Part B

Pest	Density of new infestations (%)	Proportion productive land	Years to establishment of new sites to significant	Number of new foci established each time	Proportion controlled Sustained	Proportion controlled progressive	Proportion controlled Do Nothing	Years to progressive	Years to Eradication	Production model type	Inspection cost ratio plan/sustained	Inspection cost ratio Progressive/Sustained	Inspection cost ratio Eradication/sustained	Distance to North Boundary (km)	Distance to East Boundary (km)	Distance to South Boundary (km)	Distance to West Boundary (km)
Spiny Broom	0.01	1%	2	1	0.5	0.95	0.4	50	20	Hill country	1	4	6	200	200	200	200
African Feather Grass	0.02	10%	2	2.0	90%	95%	80%	50	20	Hill country	1	4	6	200	90	200	90
Chilean needle grass	0.5	100%	2	1.2	90%	95%	80%	50	20	Hill country	1	4	6	200	90	200	90
Moth Plant	0.125	0%	2	1.0	90%	95%	10%	50	20	None	1	2	3	200	90	200	90
African Love Grass	0.125	100%	2	3.0	90%	95%	80%	50	20	Hill country	1	4	6	200	90	200	90
Boneseed	0.1	0%	2	10.0	90%	95%	20%	50	20	None	1	4	6	100	20	20	20
Bur Daisy	0.0005	50%	2	1.0	90%	95%	40%	50	20	Hill country	1	4	6	200	90	200	90
Cape Ivy	2	1%	2	3	30%	95%	10%	50	20	None	1	4	6	200	90	200	90
Nassella Tussock	0.02	100%	2	10.0	90%	95%	80%	50	50	Hill country	10	20	50	500	500	500	500
Old Mans Beard	2	75%	2	10.0	50%	95%	10%	1000	50	None	1	20	50	500	500	500	500
Perennial Nettle	0.001	100%	3	3	0.5	0.95	0.4	1000	50	Hill country	1	4	6	500	500	500	500
Spartina	1	5%	1	1	90%	95%	10%	100	50	None	1	4	6	500	500	500	500
White-edged nightshade	0.01	50%	2	5.0	90%	95%	10%	50	20	None	1	4	6	500	500	500	500
Wilding conifers	0.0005	46%	2	3.0	0.5	0.95	0.2	1000	50	High country	1	4	6	500	500	500	500
Bomarea	2	5%	2	3	30%	95%	10%	100	50	None	1	4	6	500	500	500	500

Pest	Density of new infestations (%)	Proportion productive land	Years to establishment of new sites to significant	Number of new foci established each time	Proportion controlled Sustained	Proportion controlled progressive	Proportion controlled Do Nothing	Years to progressive	Years to Eradication	Production model type	Inspection cost ratio plan/sustained	Inspection cost ratio Progressive/Sustained	Inspection cost ratio Eradication/sustained	Distance to North Boundary (km)	Distance to East Boundary (km)	Distance to South Boundary (km)	Distance to West Boundary (km)
Lagarosiphon	1	0%	2	2	30%	95%	10%	1000	100	None	1	4	6	500	500	500	500
Broom Rural	2	75%	2	1.0	0.5	0.95	0.4	1000	100	Hill country	1	20	50	500	500	500	500
Broom Urban	2	0.75	2	1	0.5	0.95	0.4	1000	100	Hill country	1	20	50	500	500	500	500
Gorse Rural	2	75%	2	1.0	0.5	0.95	0.4	1000	100	Hill country	1	20	50	500	500	500	500
Gorse Urban	2	0.75	2	1	0.5	0.95	0.4	1000	100	Hill country	1	20	50	500	500	500	500
Nodding Thistle	0.125	100%	2	3.0	0.5	0.95	0.4	50	100	Hill country	1	20	50	500	500	500	500
Ragwort	0.125	19%	2	3	0.3	0.95	0.0948651	1000	100	Dairy	1	20	50	500	500	500	500

Appendix B Assessment of level of analysis under the NPD Guidance

Organism	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Comments	A In
African feather grass	L	L	L	L	Not currently present, high impacts, unlikely to be opposition to exclusion	
African love grass	M	M	L	M	Control supported by community, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.	
Banana passion fruit	L	L	L	L	Control generally supported by community, overall costs are moderate, benefits exceed costs, impacts well understood and poor data.	
Bennett's Wallaby	M	M	L	M	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and quality data exists.	
Bomorea	L	L	L	M	Control supported by community, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.	
Boneseed	M	M	M	H	Control generally supported by community, overall costs are moderate, benefits exceed costs, impacts well understood and quality data exists.	
Broom	M	M	L	H	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and quality data exists.	
Bur daisy	M	M	L	M	Control supported by community, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.	
Cape Ivy	L	L	L	L	Control generally supported by community, overall costs are moderate, benefits exceed costs, impacts well understood and poor data.	
Chilean flame creeper	L	L	L	L	Control generally supported by community, overall costs are low, benefits exceed costs, impacts well understood and poor data.	
Chilean needle grass	L	L	L	L	Not currently present, high impacts, unlikely to be opposition to exclusion	
Darwin's barberry	L	L	L	L	Control generally supported by community, overall costs are moderate, benefits exceed costs, impacts well understood and poor data.	
False tamarisk	L	L	L	L	Not currently present, high impacts, unlikely to be opposition to exclusion	
Feral cat	M	L	L	L	Control generally supported by community although some opposition, overall costs are low, benefits exceed costs, impacts well understood and poor data.	

Feral deer (incl. hybrids)	M	L	L	L	Control generally supported by community although some opposition, overall costs are low, benefits exceed costs, impacts well understood and poor data.
Feral goat	M	L	L	L	Control generally supported by community although some opposition, overall costs are low, benefits exceed costs, impacts well understood and poor data.
Feral pig	M	L	L	L	Control generally supported by community although some opposition, overall costs are low, benefits exceed costs, impacts well understood and poor data.
Feral rabbit	M	H	L	H	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and quality data exists.
Gorse	M	M	L	H	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and quality data exists.
Hedgehog	M	L	L	L	Control generally supported by community although some opposition, overall costs are low, benefits exceed costs, impacts well understood and poor data.
Lagarosiphon	M	M	L	L	Control generally supported by community, overall costs are high, benefits exceed costs, impacts well understood and moderate data.
Moth plant	L	L	L	L	Not currently present, high impacts, unlikely to be opposition to exclusion
Mustelids (ferret, stoat, weasel)	L	L	L	L	Control generally supported by community, overall costs are low, benefits exceed costs, impacts well understood and poor data.
Nassella tussock	M	M	L	H	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and quality data exists.
Nodding thistle	M	M	L	M	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.
Old man's beard	M	M	L	M	Some in community oppose management, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and moderate data exists.
Perennial nettle	L	M	M	M	Some in community oppose management, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and moderate data exists.
Possum	L	M	L	L	Control generally supported by community, overall costs are moderate, benefits exceed costs, impacts well understood and moderate data.

Ragwort	H	M	L	M	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.
Rat (Norway, ship and Kiore)	L	L	L	L	Control generally supported by community, overall costs are low, benefits exceed costs, impacts well understood and poor data.
Rook	L	L	L	H	Control well supported by community, overall costs are low, benefits substantially exceed costs, impacts well understood and quality data exists.
Russell lupin	M	L	L	L	Some in community oppose management, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and quality data exists.
Spartina	M	M	L	M	Control supported by community, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.
Spiny broom	L	L	L	M	Control supported by community, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.
Sycamore	M	L	L	L	Control generally supported by community, overall costs are low, benefits exceed costs, impacts well understood and poor data.
Tradescantia (wandering willie)	L	L	L	L	Control generally supported by community, overall costs are moderate, benefits exceed costs, impacts well understood and poor data.
White-edged nightshade	M	M	L	M	Control supported by community, overall costs are low, benefits exceed costs, impacts are known to occur, control measures are available and some data exists.
Wilding conifers	H	M	M	H	Some in community oppose management, overall costs are high, benefits exceed costs, impacts are known to occur, control measures are available and quality data exists.

Appendix C Risk adjustment for net benefit calculation of Plant Pests

Table 54: Assumptions for risk adjustment of net benefit for Nodding thistle and Ragwort pests

	Matrix of risk	Outcomes actually achieved			
		Do Nothing	Sustained Control	Progressive Containment	Eradication
Plan undertaken	Do Nothing	80%	20%	0%	0%
	Sustained Control	80%	20%	0%	0%
	Progressive Containment	80%	20%	0%	0%
	Eradication	80%	20%	0%	0%

Table 55: Assumptions for risk adjustment of net benefit for Gorse and Broom

	Matrix of risk	Outcomes actually achieved			
		Do Nothing	Sustained Control	Progressive Containment	Eradication
Plan undertaken	Do Nothing	90%	10%	0%	0%
	Sustained Control	70%	30%	0%	0%
	Progressive Containment	70%	30%	0%	0%
	Eradication	70%	40%	0%	0%

Table 56: Assumptions for risk adjustment of net benefit for Wilding Conifers

	Matrix of risk	Outcomes actually achieved			
		Do Nothing	Sustained Control	Progressive Containment	Eradication
Plan undertaken	Do Nothing	80%	20%	0%	0%
	Sustained Control	50%	45%	5%	0%
	Progressive Containment	15%	45%	40%	0%
	Eradication	15%	45%	35%	5%

Appendix D GNR result tables

Note: green = ratio source/additional receptor costs <1.2, orange = 1.2 – 1.5, red = >1.5 or No costs incurred by receptor landholder.

Table 57: Good Neighbour Rule Model outcomes for Feral Rabbits

Source land use	Receptor land use			
	Low	Moderate	High	
Low	2.00	1.00	0.30	
Moderate	4.00	2.00	0.60	
High	10.00	5.00	1.50	

Table 58: Good Neighbour Rule Model outcomes for Gorse: Dense infestation on Source property

Gorse NPD Section 8(e)(ii) - Ratio of costs for Source land holder to the costs for the Receiving land holder - Source infestation is scattered plants

Source land use	Receptor land use									
	Dairy	Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive	
	Dairy	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
	Sheep and beef Intensive	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
	Arable	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
	Horticulture	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
	Hill country	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
	High country	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
	Conservation	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
	Forestry	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs
Non Productive	No costs	No costs	No costs	No costs	1.00	1.00	No costs	1.00	No costs	

Table 59: Good Neighbour Rule Model outcomes for Gorse: Dense infestation on Source property

Gorse NPD Section 8(e)(ii) - Ratio of costs for Source land holder to the costs for the Receiving land holder - Source infestation is dense										
Receptor land use										
Source land use		Dairy	Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive
	Dairy	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	Sheep and beef Intensive	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	Arable	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	Horticulture	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	Hill country	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	High country	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	Conservation	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	Forestry	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs
	Non Productive	No costs	No costs	No costs	No costs	1.54	1.54	No costs	1.54	No costs

Table 60: Good Neighbour Rule Model outcomes for Gorse: Scattered infestation on Source property

Broom NPD Section 8(e)(ii) - Ratio of costs for Source land holder to the costs for the Receiving land holder - Source infestation is scattered plants

Receptor land use

Source land use		Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive	
	Dairy	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	Sheep and beef Intensive	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	Arable	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	Horticulture	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	Hill country	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	High country	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	Conservation	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	Forestry	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs
	Non Productive	No costs	No costs	No costs	No costs	1.00	1.00	1.00	1.00	No costs



Table 61: Good Neighbour Rule Model outcomes for Broom: Dense infestation on Source property

Broom NPD Section 8(e)(ii) - Ratio of costs for Source land holder to the costs for the Receiving land holder - Source infestation is dense

		Receptor land use								
		Dairy	Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive
Source land use	Dairy	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	Sheep and beef Intensive	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	Arable	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	Horticulture	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	Hill country	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	High country	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	Conservation	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	Forestry	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs
	Non Productive	No costs	No costs	No costs	No costs	1.54	1.54	1.54	1.54	No costs

Table 62: Good Neighbour Rule Model outcomes for Nodding thistle tussock: scattered infestation on Source property

Nodding thistle NPD Section 8(e)(ii) - Ratio of costs for Source land holder to the costs for the Receiving land holder - Source infestation is scattered plants

		Receptor land use								
		Dairy	Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive
Source land use	Dairy	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	Sheep and beef Intensive	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	Arable	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	Horticulture	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	Hill country	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	High country	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	Conservation	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	Forestry	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs
	Non Productive	No costs	No costs	No costs	No costs	1.00	1.00	No costs	No costs	No costs

Table 63: Good Neighbour Rule Model outcomes for Ragwort: Scattered infestation on Source property

Ragwort NPD Section 8(e)(ii) - Ratio of costs for Source land holder to the costs for the Receiving land holder - Source infestation is scattered plants										
Receptor land use										
Source land use		Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive	
	Dairy	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	Sheep and beef Intensive	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	Arable	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	Horticulture	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	Hill country	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	High country	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	Conservation	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	Forestry	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs
	Non Productive	1.00	No costs	No costs	No costs	No costs	No costs	No costs	No costs	No costs

Table 64: Good Neighbour Rule Model outcomes for Wilding pines (various species): Scattered infestation on Source property

Lodgepole or contorta pine NPD Section 8(e)(ii) - Ratio of costs for Source Landholder to the costs for the Receiving landholder - Source infestation is scattered plants

Source Landuse	Receptor Landuse								
	Dairy	Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive
Dairy	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
Sheep and beef Intensive	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
Arable	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
Horticulture	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
Hill country	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
High country	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
Conservation	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
Forestry	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs
Non Productive	No costs	No costs	No costs	No costs	1.00	1.00	1.00	No costs	No costs

Table 65: Good Neighbour Rule Model outcomes for Wilding pines (various species): Dense infestation on Source property

Lodgepole or contorta pine NPD Section 8(e)(ii) - Ratio of costs for Source Landholder to the costs for the Receiving landholder - Source infestation is dense										
Source Landuse	Receptor Landuse									
		Dairy	Sheep and beef Intensive	Arable	Horticulture	Hill country	High country	Conservation	Forestry	Non Productive
	Dairy	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
	Sheep and beef Intensive	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
	Arable	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
	Horticulture	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
	Hill country	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
	High country	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
	Conservation	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
	Forestry	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs
Non Productive	No costs	No costs	No costs	No costs	8.89	8.89	8.89	No costs	No costs	



Summary of consultation undertaken on the development of the proposed Regional Pest Management Plan and proposed Biosecurity Strategy

OCTOBER 2018

INTRODUCTION

The proposed Pest Management Plan and proposed Biosecurity Strategy are to be notified for public submissions and feedback to provide opportunity to all people provide feedback as part of the formal consultation process for pest management plans under the Biosecurity Act 1991. A hearing will be held to consider and respond to all submissions on the proposed Pest Management Plan.

This document summarises the consultation that has taken place during the development of the proposed Pest Management Plan and proposed Biosecurity Strategy

A PROPOSED REGIONAL PEST MANAGEMENT PLAN AND A PROPOSED BIOSECURITY STRATEGY

Pest management plans are prepared under the Biosecurity Act 1993. A pest management plan is a regulatory document which sets out the roles and requirements (such as rules) of land occupiers and ORC to manage specified pests. They are often supported by a biosecurity strategy, which can provide higher level guidance and integration and be more adaptive and responsive while still setting out leadership for the region.

As part of the review process for the proposed Pest Management Plan, it became clear early on that much of the ORC's role in biosecurity is wider than enforcing rules and that a biosecurity strategy is also needed. It includes many other important actions to manage pests and harmful organisms and includes a number of key projects over the next few years.

This is intended to reflect the feedback ORC has received: that ORC's functions and responsibilities should be more flexible and should be integrated with and supportive of the actions of other agencies and other national, regional and local initiatives.

CONSULTATION UNDERTAKEN

STAKEHOLDER FORUM

Stakeholder engagement on the development of a new regional pest management plan commenced in October 2017.

A stakeholder forum on biodiversity and pest management was held on 31 October 2017. This provided information about developing a new Pest Management Plan and sought feedback on broader pest management issues in Otago and how these issues should be addressed.

The stakeholder forum was attended by 42 stakeholders from local government, statutory authorities, Kāi Tahu, environmental groups, trusts, and industry groups.

Feedback received during the stakeholder forum, along with community feedback during the same period was summarised and published on the ORC website in December 2017. This is titled: **A summary of community feedback on the development of a new Regional Pest Management Plan for Otago**. This feedback informed the development of the proposed Pest Management Plan and proposed Biosecurity Strategy. The summary provides a high level overview of the key issues and opportunities raised during feedback.

PROTECT YOUR PATCH POP-INS AND ONLINE FEEDBACK

ORC staff also held pop-in sessions in four locations across the region. These pop-in sessions were held in Cromwell, Dunedin, Balclutha and Oamaru from 14 – 22 November 2017. The purpose of the pop-in sessions was to provide an opportunity for people to provide their feedback in person about what should be included in the new Plan and what the ORC should be doing more of to manage pests in Otago. Just over 50 people attended the pop-ins.

During November 2017, the Council webpage also included an online questionnaire. This sought people's views on the important pest management issues in Otago. It asked similar questions to the questions ORC sought feedback on in the stakeholder forum, seeking specific feedback on:

- pests in the current Pest Management Strategy;
- pests they may wish to see in a new pest management plan; and
- any other comments they had about pest management in Otago.

Feedback received from people during the pop-ins and online feedback period, was summarised and published on the ORC website in December 2017. This is titled: **A summary of community feedback on the development of a new Regional Pest Management Plan for Otago**, and is attached as Appendix A. This feedback informed the development of the proposed Pest Management Plan and proposed Biosecurity Strategy. The summary provides a high level overview of the key issues and opportunities raised during feedback.

FURTHER KEY STAKEHOLDER FEEDBACK

Following the initial consultation undertaken in October – November 2017, key stakeholders were further consulted on the draft pests and programmes for the proposed Pest Management Plan.

This included circulating an initial list of draft species and potential programmes to stakeholders including district and regional councils, Predator Free Dunedin, Kai Tahu, Te Ao Marama and Department for Conservation in early 2018.

Consultation with stakeholders ORC is required to consult with in accordance with the Biosecurity Act 1993:

- **All district councils in Otago and all regional council neighbours** were invited to attend the initial stakeholder forum in October 2017 and invited to provide initial feedback in November 2017. The Councils were provided with an initial list of draft species and potential programmes to provide feedback on in early 2018. A draft proposed Pest Management Plan and draft proposed Biosecurity Strategy were also circulated for feedback in September 2018.
- **Ministries, including the department of conservation and the Ministry of Primary Industries** were also invited to attend the initial stakeholder forum in October 2017, invited to provide initial feedback in November 2017, and sent the proposed Pest Management Plan and draft proposed Biosecurity Strategy in September 2018.
- **Land Information New Zealand (LINZ)** were provided the same opportunity to contribute.
- **Kai Tahu through Ahuka, and Te Ao Marama** were similarly invited to attend the initial stakeholder forum in October 2017, invited to provide initial feedback in November 2017, and sent the proposed Pest Management Plan and draft proposed Biosecurity Strategy in September 2018.

Further meetings and workshops were undertaken as required with key stakeholders including some of those listed above, and others who had an interest in discussing the development of the documents further with ORC.

SCHEDULE OF CONSULTATION FORUMS, MEETINGS AND WORKSHOPS

The table below provides a summary of the various forums, meetings and workshops on the development of the proposed Pest Management Plan and proposed Biosecurity Strategy from October 2017 to September 2018.

Meeting/Workshop	Date and Location
Meeting with Environment Southland	1 September 2018, Balclutha
Meeting with Ahuka regarding Runaka engagement	20 October 2017, Dunedin
Biodiversity and pest management stakeholder forum	31 October, Dunedin Public Art Gallery

Community protect our patch pop-in session 14 November 2017, Cromwell

Community protect our patch pop-in session 16 November 2017, Dunedin

Community protect our patch pop-in session 21 November 2017, Balclutha

Community protect our patch pop-in session 22 November 2017, Oamaru

Presentation and workshop with Predator Free Dunedin 7 December 2018, Dunedin

Presentation and workshop with Dunedin City Council 23 January 2018, Dunedin

Meeting with Dunedin City Council Strategy Team 30 December 2018, Dunedin

Videoconference with Environment Canterbury 1 February 2018, Dunedin

Presentation to Dunedin Te Ao Tūroa Partnership 21 February 2018, Dunedin

Videoconference with LINZ regarding Lagarosiphon 27 April 2018, Dunedin

Videoconference with Environment Southland 2 May 2018, Dunedin

Videoconference with LINZ regarding Lagarosiphon 8 May 2018, Dunedin

Meeting with Ahuka regarding Runaka engagement 24 May 2018, Dunedin

Meeting with Federated Farmers 25 May 2018, Dunedin

Meeting with Dunedin City Council Strategy Team 25 May 2018, Dunedin

Videoconference with Queenstown Lakes District Council 6 June 2018, Dunedin

Meeting with Predator Free Dunedin 6 June 2018, Dunedin

Presentation to Royal Forest and Bird Protection Society 13 July 2018

Meeting with Department of Conservation 20 August 2018, Dunedin

Presentation and meeting with Otago Peninsula Biodiversity Group 17 September 2018, Dunedin

Videoconference with Ministry for Primary Industries 4 October 2018, Dunedin

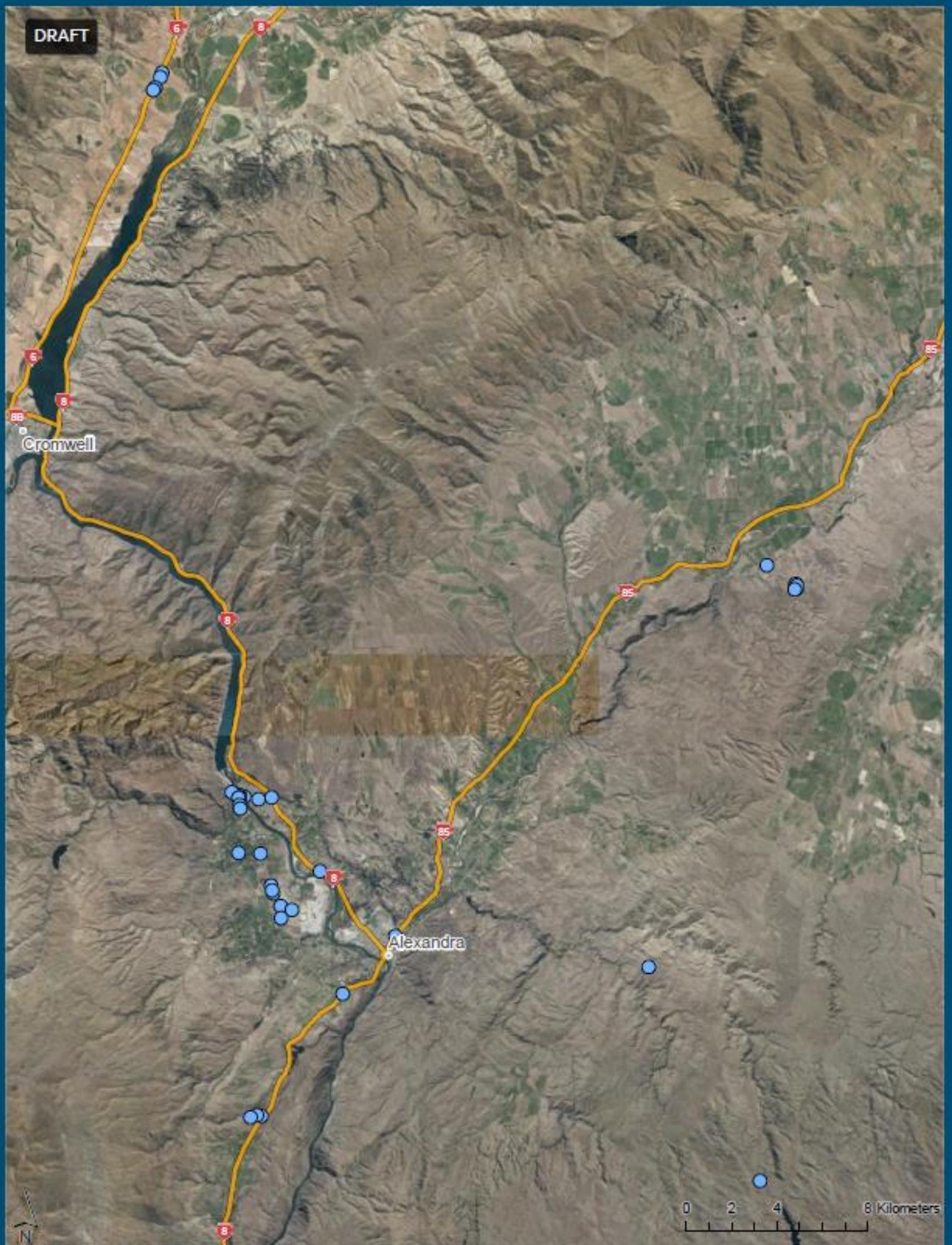
The summary table above does not include correspondence and teleconferences with key stakeholders, such as LINZ, MPI, KiwiRail, industry groups and interest groups.

Regular updates were also provided at various committees, meetings and forums that ORC biosecurity staff and stakeholder representatives regularly attend.

NOTIFICATION FOR SUBMISSIONS

Public notification of the documents is anticipated in November 2018. This will provide stakeholders, communities and individuals an additional opportunity to provide formal feedback.

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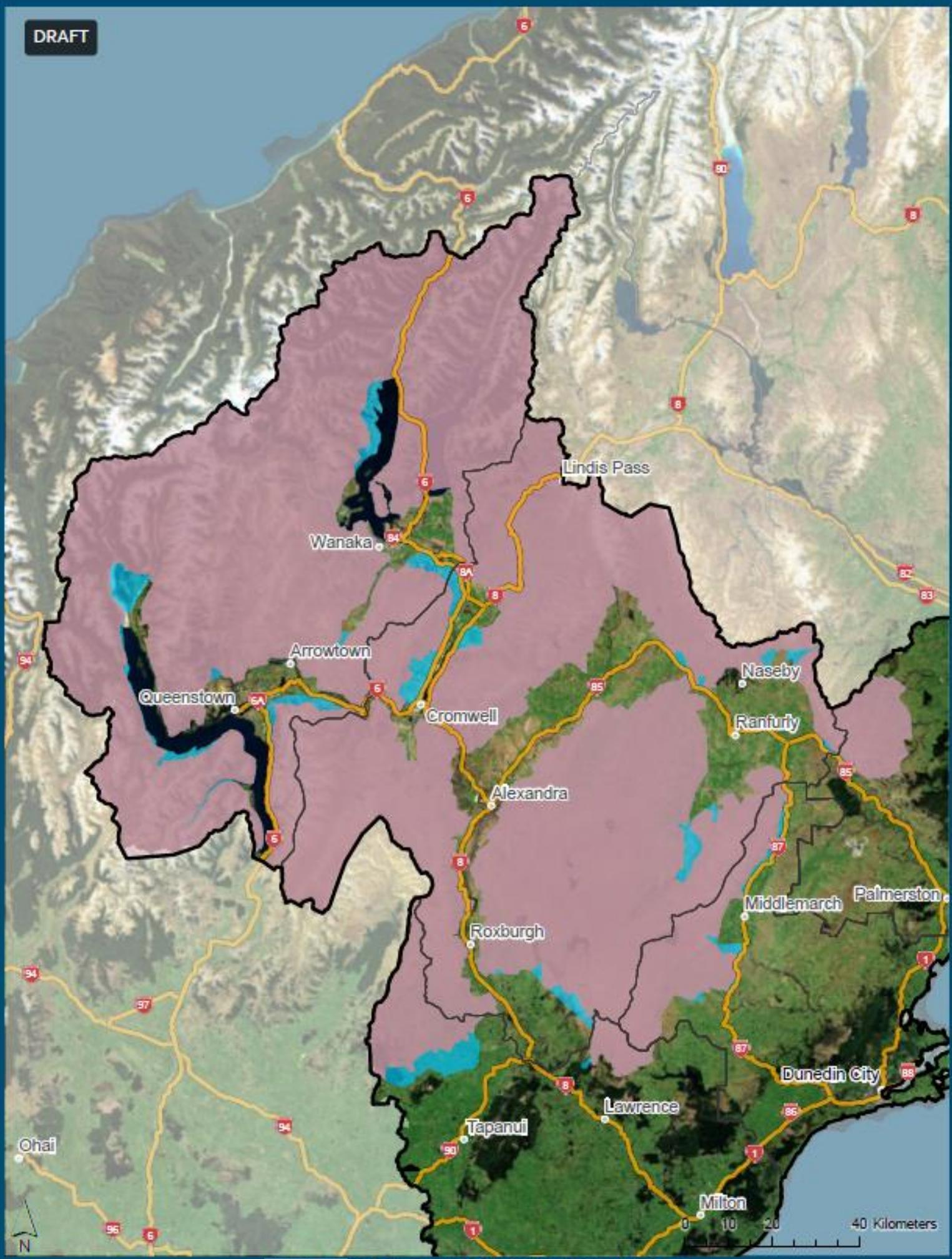
Map 1: African Love Grass

● African Love Grass Sites

Council Meeting - 31 October 2018 - Attachments

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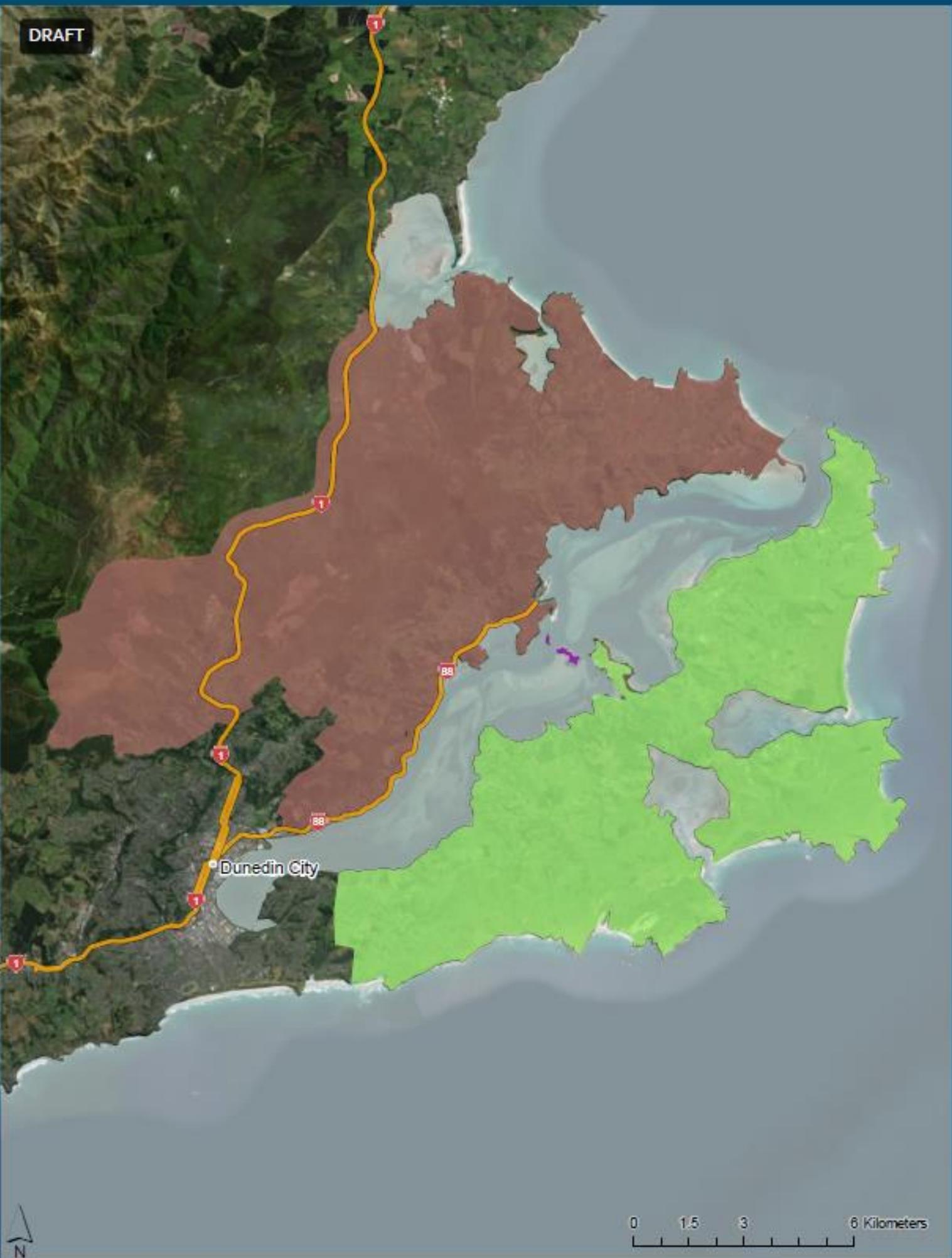


Map 2: Gorse and Broom Free Areas

Gorse and Broom Free Areas New Gorse and Broom Free Areas

Council Meeting - 31 October 2018 - Attachments

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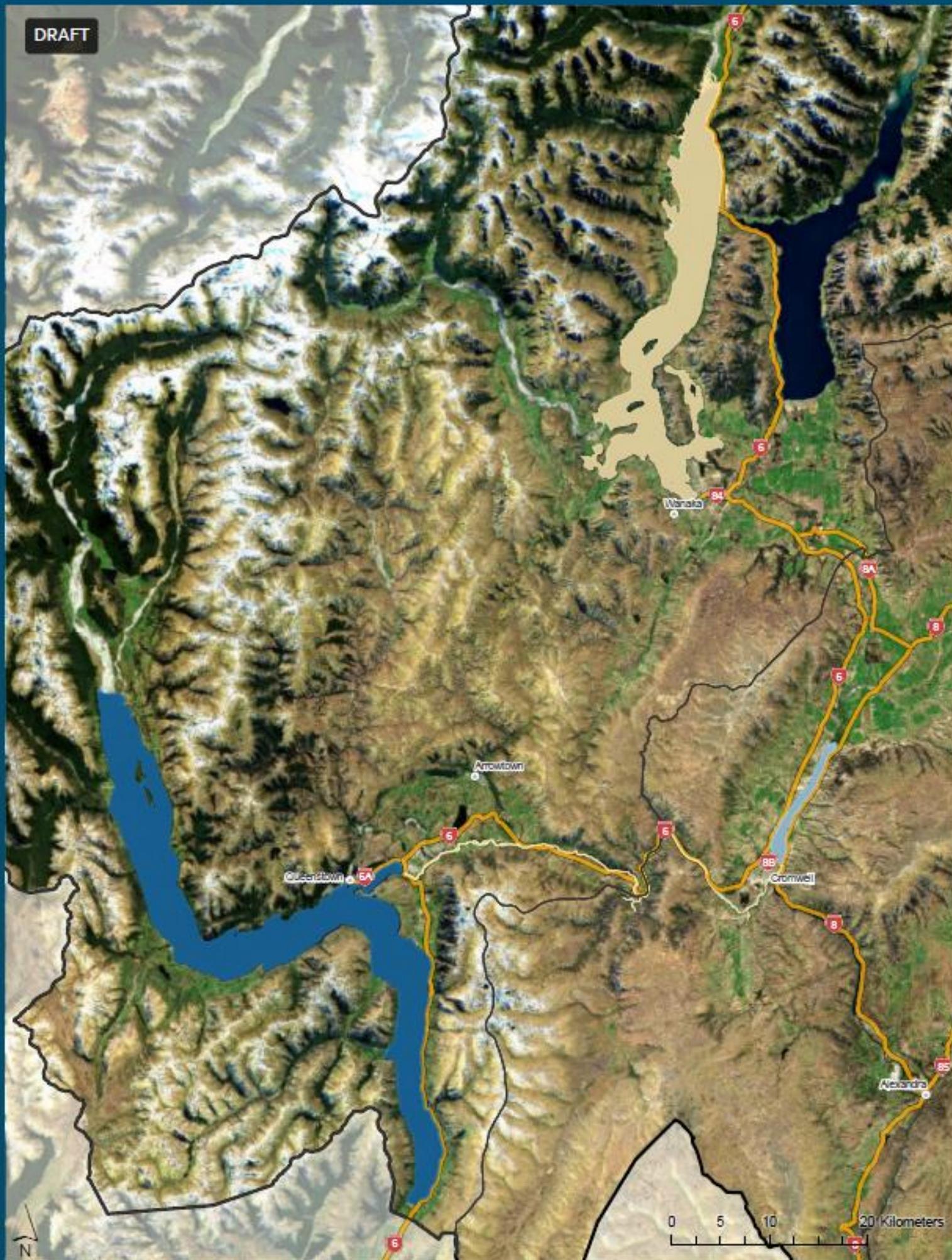


Map 3: Dunedin Site Led Programmes

Otago Peninsula Quarantine and Goat Islands West Harbour – Mt. Cargill

Council Meeting - 31 October 2018 - Attachments

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Map 4: Lagarosiphon Site Led Programme

■ Lake Dunstan Sustained Control Area ■ Lake Wanaka and Kawarau River Progressive Containment Area
■ Lake Group Circumference

AN ASSESSMENT OF THE PROPOSED OTAGO REGIONAL PEST MANAGEMENT PLAN AGAINST THE REQUIREMENTS OF SECTIONS 70 AND 71 OF THE BIOSECURITY ACT 1993 AND THE NATIONAL POLICY DIRECTION 2015

Purpose of this assessment

Otago Regional Council has prepared a Proposed Regional Pest Management Plan for Otago (the Proposal) under the Biosecurity Act 1993 (the Act).

Section 70 of the Act outlines matters that must be set out in the proposal. Section 71 outlines matters the Council must consider and be satisfied with when approving the proposal. These sections refer to requirements also contained within the National Policy Direction for Pest Management 2015 (NPD).

The tables below illustrate the relevant clauses of sections 70, 71 and the NPD. For each clause, a description is provided of how the requirements of the Act have been met.

SECTION 70: FIRST STEP: PLAN INITIATED BY PROPOSAL		
Section 70(c) of the Biosecurity Act 1993 provides that the Proposal must set out the following matters:		
Section of Act	Requirement	How it is met?
70(2)(a)	The name of the person making the proposal	Section 1.1 states it is proposed by the Otago Regional Council.
70(2)(b)	The subject of the proposal, which means – (i) the organism proposed to be specified as a pest under the plan or the organisms proposed to be specified as pests under the plan; or (ii) the class or description of organism proposed to be specified as a pest under the plan or the classes or descriptions of organisms proposed to be specified as pests under the plan:	Section 4.1 (list of organisms classified as pests) and section 6 (details of pests).
70(2)(c)	For each subject -	
	(i) a description of its adverse effects:	Section 6 (particularly Table 5) describes the adverse effects of each pest.
	(ii) the reasons for proposing a plan: [specific to the pest subject]	The overall purpose of why the plan was proposed is stated in section 1.2, applying to all of the pests contained in the Proposal. Section 6 discusses the purpose of the plan specific to each pest in more detail.
	(iii) the objectives that the plan would have: <i>Clause 4 of the NPD provides directions on setting objectives. An assessment against these directions has been undertaken in accordance with section 71 of the Act as set out in the NPD analysis table below.</i>	Section 6 outlines the objectives of the proposal, in relation to each pest (more detailed requirements of the NPD regarding objectives are outlined in Table 3).
	(iv) the principal measures that would be in the plan to achieve the objectives:	The principal measures to be used in the plan to achieve the objectives are stated in section 5.3. The measures used for each pest are discussed in section 6.
(v) other measures that it would be reasonable to take to achieve the objectives, if there are any such measures, and the reasons why the proposed measures are preferable as a means of achieving the objectives:	Section 6. For each objective there is an analysis of alternatives considered, including the proposed measures.	

	(vi) the reasons why the plan is more appropriate than relying on voluntary actions:	Section 6 states many of the alternatives considered. Section 6 also explains why the Proposal and subsequent plan is more appropriate than relying on voluntary action.
	(vii) an analysis of the benefits and costs of the plan: <i>Clause 6 of the NPD provides directions on analysing benefits and costs. An assessment against these directions has been undertaken in accordance with section 71 of the Act as set out in the table below</i>	Section 9.2 provides a summary of the costs and benefits, with the Cost Benefit Analysis (CBA) providing more detailed analysis.
	(viii) the extent to which any persons, or persons of a class or description, are likely to benefit from the plan:	Section 9.4 of the Proposal identifies beneficiaries and exacerbators. The extent to which they would benefit from the plan or exacerbate the problems addressed by the plan is addressed in the various places, particularly in section 6 (which describes the effects of each pest) and section 9.2 (which outlines net benefits of the plan). See the CBA report for more detailed analysis of costs and benefits.
	(ix) the extent to which any persons, or persons of a class or description, contribute to the creation, continuance, or exacerbation of the problems proposed to be resolved by the plan:	As for (viii) (above)
	(x) the rationale for the proposed allocation of costs: <i>Clause 7 of the NPD provides directions on proposed allocation of costs for pest management plans. An assessment against these directions has been undertaken in accordance with section 71 of the Act as set out in the table below</i>	Section 9.5 outlines the cost allocation and funding rationale. Further detail provided in the CBA report.
	(xi) if it is proposed that the plan be funded by a levy under section 100L, how the proposed levy satisfies section 100L(5)(d) and what matters will be specified under section 100N(1):	Not Applicable. Funding via a section 100L levy is not proposed.
	(xii) whether any unusual administrative problems or costs are expected in recovering the costs allocated to any of the persons whom the plan would require to pay the costs:	Section 9.7 explains that no unusual problems or costs are expected.
70(2)(d)	Any other organism intended to be controlled:	Section 4.3 addresses this issue.
70(2)(e)	The effects that, in the opinion of the person making the proposal, implementation of the plan would have on –	
	(i) economic well-being, the environment, human health, enjoyment of the natural environment, and the relationship between Maori, their culture, and their traditions and their ancestral lands, waters, sites, wahi tapu, and taonga:	Section 9.3. describes these effects.
	(ii) the marketing overseas of New Zealand products:	Section 9.3 describes these effects.
70(2)(f)	If the plan would affect another pest management plan or a pathway management plan, how it is proposed to co-ordinate the implementation of the plans:	Section 2.3.1 discusses this. Neighbouring regions have some pests in their plans or strategies which are not covered in the Proposal. However as each region seeks to address different biosecurity issues in their region, this is not regarded as an inconsistency.
70(2)(g)	The powers in Part 6 that it is proposed to use to implement the plan:	Section 8.1 outlines the powers to be used to implement the plan.
70(2)(h)	Each proposed rule and an explanation of its purpose:	Section 5.4 and Section 6. All rules are contained and explained in this section.

70(2)(i)	The rules, if any, that are intended to be good neighbour rules: <i>Clause 8 of the NPD provides directions on good neighbour rules. An assessment against these directions has been undertaken in accordance with section 71 of the Act as set out in the table below</i>	5.4. The rules that are intended to be good neighbour rules are clearly identified.
70(2)(j)	The rules whose contravention is proposed to be an offence under this Act:	Section 6. Each rule contains a statement that contravention of the rule creates an offence under the Act.
70(2)(k)	The management agency:	Section 3.1 states Otago Regional Council will be the management agency.
70(2)(l)	The means by which it is proposed to monitor or measure the achievement of the plan's objectives:	Section 7.1 provides details on proposed monitoring of the objectives and outcomes for each pest.
70(2)(m)	The actions that it is proposed local authorities, local authorities of a specified class or description, or specified local authorities may take to implement the plan, including contributing towards the costs of implementation:	Section 3.1 states that Otago Regional Council, as the management agency, will use the measures described in the Proposal, in conjunction with its operational procedures, to implement the Plan. Sections 3.3.3 and 3.3.4 refer to the requirement for territorial authorities to control pests on land they occupy and the control of pests in road reserves.
70(2)(n)	The basis, if any, on which the management agency is to pay compensation for losses incurred as a direct result of the implementation of the plan:	Section 3.2 states that the plan will not provide for compensation to be paid to any persons meeting their obligations through its implementation.
70(2)(o)	Information on the disposal of the proceeds of any receipts arising in the course of implementing the plan:	Section 3.2 states that should net proceeds arise, a disbursement will be paid in accordance with the s100I of the Act.
70(2)(p)	Whether the plan includes portions of road adjoining land it covers, as authorised by section 6, and, if so, the portions of road proposed to be included:	Section 3.3.4 outlines responsibilities in road reserves and the portions of road to which the plan applies.
70(2)(q)	The anticipated costs of implementing the plan:	Section 9, especially 9.6, describes the cost of implementation.
70(2)(r)	How it is proposed that the costs be funded:	Section 9, especially 9.5, outlines how the costs will be funded.
70(2)(s)	The period for which it is proposed the plan be in force:	Section 1.3 states that the plan will be in force for 10 years or an earlier date by public notice.
70(2)(t)	The consultation, if any, that has occurred on the proposal and the outcome of it:	Section 2.5 outlines consultation to date in preparing the Proposal.
70(2)(u)	Any matter that the national policy direction requires to be specified in a plan:	Refer to Table 1 of the proposal, and the next sections of this table regarding compliance with the NPD.
70(2)(v)	The steps that have been taken to comply with the process requirements in the NPD, if there were any.	As above.

SECTION 71 SECOND STEP: SATISFACTION ON REQUIREMENTS

Section 71 of the Biosecurity Act 1993 provides that if the Council is satisfied that section 70 has been complied with, the council is then to consider whether the council is satisfied of the following matters:

Section of Act	Requirement	Can the Council be satisfied?
71(a)	That the Proposal is not inconsistent with- (i) the national policy direction; or The NPD contains the following relevant directions: <i>Clause 4 – Directions on setting objectives</i> <i>Clause 5 – Directions on programme description</i> <i>Clause 6 – directions on analysing benefits and costs</i>	Yes. Section 2.2.2 addresses this, along with the analysis of compliance with the NPD outlined in this table.

	<p><i>Clause 7 – Directions on proposed allocation of costs for pest management plans</i></p> <p><i>Clause 8 – Directions on Good Neighbour Rules</i></p>	
	(ii) any other pest management plan on the same organism; or	Yes, see Section 2.3.1 of the proposal.
	(iii) any pathway management plan; or	Yes. The proposal is not inconsistent with any pathway management plan.
	(iv) a regional policy statement or regional plan prepared under the Resource Management Act 1991; or	Yes, Section 2.3.2 discusses the relationship with RMA plans and policy statements; there is no inconsistency.
	(v) any regulations; and	Yes, discussed at Section 2.3.3. There are no known inconsistencies with any regulations.
71(b)	That, during the development of the proposal, the process requirements for a plan in the national policy direction, if there were any, were complied with; and	Yes, refer to NPD analysis of compliance outlined in Table 1 of the proposal, and the next sections of this table regarding compliance with the NPD.
71(c)	That the proposal has merit as a means of eradicating or effectively managing the subject of the proposal, which means - (i) the organism proposed to be specified as a pest under the plan or the organisms proposed to be specified as pests under the plan; or (ii) the class or description of organism proposed to be specified as a pests under the plan or the classes or descriptions of organisms proposed to be specified as pests under the plan; and	Yes, the proposal has merit as a means of eradicating or effectively managing pests and has been informed by research and analysis, including the CBA report, and engagement with stakeholders.
71(d)	<p>That each subject is capable of causing at some time an adverse effect on 1 or more of the following in the region:</p> <p>(i) economic wellbeing;</p> <p>(ii) the viability of threatened species of organisms;</p> <p>(iii) the survival and distribution of indigenous plants or animals;</p> <p>(iv) the sustainability of natural and developed ecosystems, ecological processes, and biological diversity;</p> <p>(v) soil resources;</p> <p>(vi) water quality;</p> <p>(vii) human health;</p> <p>(viii) social and cultural wellbeing;</p> <p>(ix) the enjoyment of recreational value of the natural environment;</p> <p>(x) the relationship between Maori, their culture, and their traditions and their ancestral lands, waters, sites, wahi tapu, and taonga;</p> <p>(xi) animal welfare; and</p>	Yes, the adverse effects of each subject pest is outlined in Section 6 and in the CBA Report.
71(e)	That, for each subject, the benefits of the plan would outweigh the costs, after taking account of the likely consequences of inaction or other courses of action; and	Yes, the costs and benefits are summarised within the Proposal, along with alternative actions and inaction. The detailed assessment of these matters is contained with the CBA Report.
71(f)	That, for each subject, persons who are required, as a group, to meet directly any or all of the costs of implementing the plan - (i) would accrue, as a group, benefits outweighing the cost; or (ii) contribute, as a group, to the creation, continuance, or	Yes. The beneficiaries and exacerbators are documented within Section 9 of the Proposal and the CBA Report, together with the overall costs and benefits of implementing the plan.
71(g)	That, for each subject, there is likely to be adequate funding for the implementation of	Yes. A funding analysis is set out in section 9. The costs of implementing the Proposal are outlined in section 9.6 along with proposed funding sources in section 9.5. The Council,

	the plan for the shorter of its proposed duration and 5 years; and	as the management agency, would have the authority to rate and amend rates to implement the plan.
71(h)	That each proposed rule -	
	(i) would assist in achieving the plan's objectives; and	Yes. The rules provide a regulatory tool to ensure appropriate actions are taken by landowners and occupiers, the Council or other parties, and that these actions are effective and efficient.
	(ii) would not trespass unduly on the rights of individuals; and	Yes. The rules are the same or similar to rules already in place in Otago and many other areas of New Zealand. Targeted consultation with key stakeholders has been undertaken and formal public consultation will provide additional opportunities for any affected party to submit.
71(i)	That the proposal is not frivolous or vexatious; and	Yes; the proposal is neither frivolous or vexatious.
71(j)	That the proposal is clear enough to be readily understood;	Yes. The format is guided by the requirements of the NPD, and the requirement to ensure the Proposal is aligned to the pest management plans of neighbouring regions.
71(k)	That, if the council rejected a similar proposal within the last 3 years, new and material information answers the council's objection to the previous proposal.	Not applicable; no similar proposal has been considered in the last three years.
NATIONAL POLICY DIRECTION (NPD) FOR PEST MANAGEMENT 2015		
Section 70 of the Biosecurity Act 1993 requires (among other things) in (u) that any matter that the national policy direction requires to be specified in a plan; and (v) the steps that have been taken to comply with the process requirements in the national policy direction, if there were any.		
Section 71 of the Biosecurity Act 1993 requires the Council to consider whether the council is satisfied that there is no inconsistency with the national policy direction.		
NPD Section	Requirement	How is this addressed?
4. DIRECTIONS ON SETTING OBJECTIVES - Pest Management Plan		
4(1)	For each subject in a proposal for a pest management plan, or in a pest management plan, the objectives in the plan must:	
4(1)(a)	state the particular adverse effect or effects of the subject on the matters listed in section 54(a) of the Act that the plan addresses; and	The adverse effects of each pest are described in the relevant objectives set out in section 6.
4(1)(b)	state the pest management intermediate outcomes that the plan is seeking to achieve, being one or more of the following intermediate outcomes: (i) "exclusion" which means to prevent the establishment of the subject that is present in New Zealand but not yet established in an area; (ii) "eradication" which means to reduce the infestation level of the subject to zero levels in an area in the short to medium term; (iii) "progressive containment" which means to contain or reduce the geographic distribution of the subject to an area over time; (iv) "sustained control" which means to provide for ongoing control of the subject to reduce its impacts and its spread to other properties; (v) "protecting values in places" which means that the subject that is capable of causing damage to a place is excluded or eradicated from that place, or is contained, reduced, or controlled within the place to an extent that protects the values of that place;	All pests are to be managed under programmes which seek to achieve either exclusion, eradication, progressive containment, sustained control or protecting values in places (site-led) outcomes. These outcomes are reflected in the objectives in section 6.
4(1)(c)	for each applicable outcome in sub clause (1)(b)(i) to (iv), specify -	(i) The geographic area to which the outcome applies is described in each objective, being either the Otago region

	<p>(i) the geographic area to which the outcome applies; and</p> <p>(ii) the extent to which the outcome will be achieved (if applicable); and</p> <p>(iii) the period within which the outcome is expected to be achieved; and</p>	<p>or a specified area shown on the maps contained in Appendix 3.</p> <p>(ii) The extent to which the outcomes will be achieved are specified within each objective.</p> <p>(iii) The period within which outcomes are expected to be achieved is generally the duration of the plan. Where necessary, the objectives state the outcome to be achieved in the first 10 years as required by 4(1)(f) below.</p>
4(1)(d)	<p>for the outcome in sub clause (1)(b)(v) ["protecting values in places "] (if applicable), specify-</p> <p>(i) one of the following:</p> <p>(A) the geographic area to which the outcome applies (if practicable); or</p> <p>(B) a description of a place to which the outcome applies; or</p> <p>(C) the criteria for defining the place to which the outcome applies; and</p> <p>(ii) the extent to which the outcome will be achieved (if applicable); and</p> <p>(iii) the period within which the outcome is expected to be achieved; and</p>	<p>In each of the objectives that relate to site-led programmes with intermediate outcomes of "protecting values in places", the relevant geographic area is defined with reference to maps set out in Appendix 3.</p>
4(1)(e)	<p>In relation to sub clause (1)(d)(i)(B) and (C), if a description or criteria is used to describe places to which an outcome applies, the description or criteria must give sufficient certainty, in the view of the relevant regional council (in the case of regional pest or pathway management plans) or the Minister responsible for the plan (in the case of national pest or pathway management plans), to land owners and occupiers so that they are aware that the outcome applies to them; and</p>	<p>Not applicable as maps, rather than a description or criteria, are used to describe places.</p>
4(1)(f)	<p>if the period within which the pest management intermediate outcome is expected to be achieved is more than 10 years, state what is intended to be achieved in the first 10 years of the plan, or during the current term of the plan prior to next review (as applicable).</p>	<p>Where necessary, 10-year outcomes are provided. In many instances the outcome is on-going and applies year on year (such as preventing the spread of a containment pest).</p>
5. DIRECTIONS ON PROGRAMME DESCRIPTION		
5(1)	<p>For each subject in a pest management plan or pathway management plan, the plan must contain one or more of the following programmes, and may not contain any other types of programmes: (a) "Exclusion Programme" (if applicable) in which the intermediate outcome for the programme is to prevent the establishment of the subject, or an organism being spread by the subject, that is present in New Zealand but not yet established in an area:</p> <p>(b) "Eradication Programme" (if applicable) in which the intermediate outcome for the programme is to reduce the infestation level of the subject, or an organism being spread by the subject, to zero levels in an area in the short to medium term:</p> <p>(c) "Progressive Containment Programme" (if applicable) in which the intermediate outcome for the programme is to contain or reduce the geographic distribution of the subject, or an organism being spread by the subject, to an area over time:</p>	<p>As outlined in section 6, all pests are included within one of these programmes. There are no other programmes proposed.</p>

	(d) "Sustained Control Programme" (if applicable) in which the intermediate outcome for the programme is to provide for ongoing control of the subject, or an organism being spread by the subject, to reduce its impacts on values and spread to other properties: (e) "Site-led Pest Programme" (if applicable) in which the intermediate outcome for the programme is that the subject, or an organism being spread by the subject, that is capable of causing damage to a place is excluded or eradicated from that place, or is contained, reduced, or controlled within the place to an extent that protects the values of that place: (f) for pathway management plans, if none of the programmes in subclause (a) to (e) are applicable, the plan must contain a "Pathway Programme" in which the intermediate outcome for the programme is to reduce the spread of harmful organisms.	
5(2)	The specific names for programmes as set out in sub clause (l)(a) to (f) must be used as appropriate in all pest management plans and pathway management plans.	These specific programme names are used.
5(3)	The programme selected for a subject in a plan under sub clause (1) must be consistent with the pest management intermediate outcome stated for the subject in the plan under clause 4 of this national policy direction.	As outlined in relation to clause 4 of the NPD in this table, the programmes are consistent with the intermediate outcomes set out under clause 4 of the NPD.
6. DIRECTIONS ON ANALYSING BENEFITS AND COSTS		
6(1)	When determining the appropriate level of analysis of the benefits and costs of the plan for each subject for the purposes of a proposal for a pest management plan or pathway management plan, a proposer must 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.	The CBA report applies and documents the criteria used to determine the level of analysis, at Appendix B.
6(2)	In the proposal for a pest management plan or pathway management plan, an analysis of the benefits and costs of the plan for each subject must: (a) identify, and quantify (if practicable), the impacts of the proposed subject or an organism being spread by the subject; and (b) identify two or more options for responding to the subject or an organism being spread by the subject (one option must be either taking no action or taking the actions that would be expected in the absence of a plan); and (c) identify, and quantify (if practicable), the benefits of each option; and	The analysis for each pest outlined in the CBA report meet these requirements. A summary of this analysis is contained within the proposal, in relation to each pest. The risks, and where possible, any realistic mitigation measures, are described in the CBA Report and the quantified costs and benefits have been adjusted to account for these. The CBA Report also outlines non-quantified benefits and costs. Where quantified costs and benefits indicate a negative net benefit from the programme, the unquantified benefits and costs are described, and a dollar figure given for the value of the unquantified net benefits required to achieve an overall positive net benefit.

	<p>(d) identify, and quantify (if practicable), the costs of each option; and</p> <p>(e) state the assumptions (if any) on which the impacts, benefits and costs are based; and</p> <p>(f) be at an appropriate level of detail as determined in accordance with sub clause (1); and</p> <p>(g) take into account any risks that each option will not achieve its objective; and</p> <p>(h) identify any realistic mitigation options for the risks identified in sub clause (2)(g); and</p> <p>(i) adjust the benefits and costs for each option as appropriate to take account of sub clause (2)(g) and (h); and</p> <p>(j) clearly identify which option is preferred.</p>	<p>The proposal summarises the options considered and identifies a preferred option (Proposed Objective) and outlines the reasons for selecting this option.</p>
6(3)	<p>When taking into account any risks that each option will not achieve its objective under sub clause (2)(g), a proposer must consider:</p> <p>(a) the technical and operational risks of the option; and</p> <p>(b) the extent to which the option will be implemented and complied with; and</p> <p>(c) the risk that compliance with other legislation will adversely affect implementation of the option; and</p> <p>(d) the risk that public or political concerns will adversely affect implementation of the option; and</p> <p>(e) any other material risk.</p>	<p>The CBA report assesses and documents these factors, in relation to each pest.</p>
6(4)	<p>When taking into account any risks that each option will not achieve its objective under sub clause (2)(g), a proposer must:</p> <p>(a) for analyses where the benefits are fully quantified, either:</p> <p>(i) estimate the residual risks as a probability of success and calculate the expected benefits of the option by multiplying the benefits by the probability of success; or</p> <p>(ii) state the residual risks to the programme and calculate what the probability of success would need to be to make the expected benefits equal the costs; and</p> <p>(b) for all other analyses (where the benefits are not fully quantified):</p> <p>(i) state the residual risks to the programme and, where practicable, give an indication of likelihood and impact; and</p> <p>(ii) specify which of the benefits are most likely to be affected if the risk eventuated.</p>	<p>The CBA Report analysis of quantifiable benefits has followed the approach required under section 6(4) of the NPD.</p> <p>The risks to the programme for each pest are documented for both quantified and non-quantified benefits. Where the benefits have not been fully quantified, the benefits are described and an additional step has been taken to identify the value of the benefit required to give a positive net benefit (as described above).</p>
6(5)	<p>The proposer of a pest management plan or pathway management plan must document the assessments made in sub clauses (1), (3) and (4) and make them publicly available with the proposal for a pest or pathway management plan.</p>	<p>These assessments are contained within the CBA Report, which will be made publicly available.</p>
7. DIRECTIONS ON PROPOSED ALLOCATION OF COSTS FOR PEST AND PATHWAY MANAGEMENT PLANS		
7(1)	<p>If a proposer of a pest or pathway management plan is determining an appropriate grouping of subjects, or organisms being spread by the subject, for cost allocation analysis, the proposer must consider:</p> <p>(a) whether the subjects, or organisms being spread by the subject, have similar groups of beneficiaries and exacerbators; and</p>	<p>The CBA analyses the cost allocation for each pest individually, rather than grouping subject pests.</p>

	<p>(b) whether the exacerbators have similar existing legislative responsibilities and rights; and</p> <p>(c) if applicable, whether the organisms in a proposed pest management plan are at a similar stage of infestation and whether the proposer has similar management objectives for the organisms.</p>	
7(2)	<p>When determining the appropriate cost allocation to be proposed for a pest management plan or pathway management plan, a proposer must:</p> <p>(a) identify and estimate the direct costs of the plan and identify the indirect costs of the plan; and</p> <p>(b) where possible, identify the beneficiaries of the plan; and</p> <p>(c) where possible, identify the active and passive exacerbators; and</p> <p>(d) determine whether the best cost allocation method is to have beneficiaries or exacerbators or a mixture of both bearing the costs of the plan and determine the appropriate cost allocation by considering all of the following matters:</p> <p>(i) the legislative responsibilities and rights of beneficiaries and exacerbators;</p> <p>(ii) the management objectives of the plan and the stage of infestation;</p> <p>(iii) the most effective agents to undertake the control to meet the objectives of the plan;</p> <p>(iv) if proposing that beneficiaries bear any of the costs of the plan, how much each group of beneficiaries will benefit from the plan and whether each group of beneficiaries will benefit more than the amount of costs that it is proposed that it bear;</p> <p>(v) if proposing that exacerbators bear any of the costs of the plan, how much each group of exacerbators is contributing to the problem addressed by the plan;</p> <p>(vi) the degree of urgency to make the plan;</p> <p>(vii) efficiency and effectiveness of the cost allocation method and proposed cost allocation;</p> <p>(viii) practicality of the cost allocation method and proposed cost allocation;</p> <p>(ix) administrative efficiency of the cost allocation method and proposed cost allocation;</p> <p>(x) security of funding of the cost allocation method and proposed cost allocation;</p> <p>(xi) fairness of the cost allocation method and proposed cost allocation;</p> <p>(xii) whether the proposed cost allocation is reasonable;</p> <p>(xiii) the parties who will bear the indirect costs of the plan;</p> <p>(xiv) the need for any transitional cost allocation arrangements;</p> <p>(xv) the mechanisms available to impose the cost allocation; and</p> <p>(e) consider what is the best mechanism(s) to impose the cost allocation, taking into account the cost allocation method chosen, the most effective control tools and agents to</p>	<p>In relation to (a), The CBA estimates and outlines the direct and indirect costs for each pest.</p> <p>In relation to (b) and (c), The CBA and the Proposal identify and describe the beneficiaries and exacerbators, for each pest.</p> <p>In relation to (d), the CBA Report addresses all of these matters. The proposal summarises a component of this assessment at section 9.</p> <p>In relation to (e), all of have been considered in choosing the cost allocation mechanism and an overall judgement made as to which is the best mechanism. This assessment is reflected in various parts of the proposal, including the choice of programme, objective, principal measures and alternatives considered, predominantly at section 6. In relation to (f), cost allocation and specifically the rationale for the allocation of costs, is discussed at section 9. This section summarises the more detailed analysis contained within the CBA.</p>

	undertake the control to meet the objectives of the plan, practicality, administrative efficiency, security of funding and any statutory requirements; and (f) document the steps and assessments carried out under sub clause (a) to (e) and the rationale for the proposed allocation of costs, and make them publicly available with the proposal for a pest or pathway management plan.	
8. DIRECTIONS ON GOOD NEIGHBOUR RULES		
8(1)	Before a rule can be identified as a good neighbour rule in a regional pest management plan, the regional council must be satisfied of the matters in sub clause (a), (c), and (d) and must comply with the requirements in sub clause (b) and (e):	Note that, in relation to the good neighbour rules, Council must satisfy itself of the matters outlined at clauses (a), (c) and (d), and ensure the proposal complies with clauses (b) and (e). These are addressed separately below.
	(a) In the absence of the rule, the pest would spread to land that is adjacent or nearby within the life of the plan and would cause unreasonable costs to an occupier of that land.	The good neighbour rules included in the proposal only apply to pests whose characteristics and ability to spread are well known. Council can be satisfied.
	(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest.	This clause is complied with, as outlined in respect to clause (a). The rules for each pest reflect the distribution of that pest, and the distance and speed that pest can spread.
	(c) The occupier of the land that is adjacent or nearby, as described in sub clause (a), is taking reasonable measures to manage the pest or its impacts.	The applicable good neighbour rules only apply if the adjacent occupier is undertaking reasonable measures to control that pest. Council can be satisfied.
	(d) The rule does not set a requirement on an occupier that is greater than that required to manage the spread of the pest to adjacent or nearby land as described in sub clause (a).	The control methods applicable to the good neighbour rules in the proposal are well known and cost effective.
	(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, the regional council must consider: (i) the biological characteristics and behaviour of the particular pest; and (ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.	As in relation to (a) to (d) above, the specific characteristics of each pest are considered. The CBA specifically address the requirement at 8(c)(ii). Council can be satisfied.

Community Based Plan Development

Time Line and Milestones

As at 23 October 2018



**Emergency
Management Otago**
Te Rākau Whakamarumarū Ōtākou

District	Community	Community Engagement Commenced	Community Group Established	Draft Prepared with TLA support	Draft Presented to Community for Approval	Draft Finalised	Plan Published	Notes
Queenstown Lakes	Arrowtown						Published	
	Arthurs Point	Feb 19	May 19	June 19	Oct 19	Dec 19	Feb 20	
	Cardrona	Apr 19	May 19	June 19	Oct 19	Nov 19	Dec 19	
	Closeburn	Sept 18	Nov 18	Dec 18	Dec 18	Feb 19	Feb 19	Close liaison required with FENZ i.e. Red Zone
	Frankton	Oct 18	June 19	June 19	June 19	July 19	July 19	
	Gibbston						Published	
	Glenorchy					Nov 18	Dec 18	
	Jacks Point / Kelvin Peninsula						Published	
	Kingston						Published	
	Lake Hawea						Published	
	Makarora						Published	
	Matukituki Valley	Mar 19	Apr 19	June 19	Nov 19	Nov 19	Dec 19	
	Queenstown CBD / Fernhill	Oct 18	June 19	June 19	Oct 19	Nov 19	Dec 19	Queenstown CBD will require considerable engagement with the tourism, hospitality and business sectors
	Shotover Country / Lake Hayes / Lake Hayes Estate						Published	
Wanaka	Oct 18	Mar 19	Feb 19	Mar 19	May 19	June 19		

District	Community	Community Engagement Commenced	Community Group Established	Draft Prepared with TLA support	Draft Presented to Community for Approval	Draft Finalised	Plan Published	Notes
Central Otago	Cromwell						Published	
	Ida Valley				Feb 19	Apr 19	May 19	
	Manuherikia				Mar 19	May 19	July 19	
	Naseby, Ranfurly, Maniototo						Published	
	Queensberry				Mar 19	May 19	July 19	
	Tarras / Lindis		Feb 19	Apr 19	May 19	July 19	Aug 19	
	Teviot				Nov 18	Mar 19	May 19	
	Clyde	Feb 19	Apr 19	May 19	June 19	Sept 19	Oct 19	Plans for these three communities overlap and will be developed together
	Earnsclough	Feb 19	Apr 19	May 19	June 19	Sept 19	Oct 19	
	Alexandra	Feb 19	Apr 19	May 19	June 19	Sept 19	Oct 19	
Waitaki	Hampden				Nov 18	Jan 19	Mar 19	
	Kakanui						Published	
	Kurow						Published	
	Moeraki				Nov 18	Jan 19	Mar 19	
	Oamaru	Feb 19	Apr 19	June 19	July 19	Sept 19	Dec 19	
	Omarama	Nov 18	Jan 19	Mar 19	Apr 19	May 19	June 19	
	Otematata	Nov 18	Jan 19	Mar 19	Apr 19	May 19	June 19	
	Palmerston				Nov 18	Jan 19	Mar 19	
	Waitaki Bridge						Published	
	Weston	Nov 18	Feb 19	May 19	June 19	July 19	Aug 19	

District	Community	Community Engagement Commenced	Community Group Established	Draft Prepared with TLA support	Draft Presented to Community for Approval	Draft Finalised	Plan Published	Notes
Clutha	Balclutha / Stirling / Finegand			June 19	*	*	*	Evacuation plan exists
	Owaka			Mar 19	*	*	*	Initial meeting held
	Clinton / Waipahi			Mar 19	*	*	*	
	Clutha Valley						Dec 18	Revisions complete, in final design
	Kaka Point						Dec 18	Revisions complete, in final design
	Kaitangata / Inch Clutha			Mar 19	*	*	*	Adverse event plan for stock movement only
	Lawrence / Waitahuna / Beaumont		Dec 18	Mar 19	*	*	*	
	Milton / Tokoiti / Milburn			Mar 19	*	*	*	
	New Haven						Nov 18	Revisions complete, in final design
	Papatowai / Takahopa / Chaslands			Mar 19	*	*	*	Initial meeting held
	Pounaweia						Dec 18	Revisions complete, in final design
	Tapanui / Heriot			Mar 19	*	*	*	
	Taieri Mouth			Mar 19	*	*	*	
	Toko Mouth						Dec 18	Revisions complete, in final design
Waihola			June 19	*	*	*		

* As per previous agreed programme (CDC)

District	Community	Community Engagement Commenced	Community Group Established	Draft Prepared with TLA support	Draft Presented to Community for Approval	Draft Finalised	Plan Published	Notes
Dunedin	Aramoana			Feb 19	May 19	Jul 19	Aug 19	
	Blueskin Bay		Mar 19	Jun 19	Sept 19	Mar 20	May 20	
	Brighton Coast			Nov 18	Feb 19	May 19	July 19	
	Brockville	Jan 19	Mar 19	June 19	Sept 19	Nov 19	Feb 20	
	Dunedin Southern Urban Area			Mar 19	May 19	July 19	Aug 19	
	Long Beach / Purakanui		Feb 19	Apr 19	June 19	Aug 19	Oct 19	
	Mosgiel / Taieri						Completed	
	North East Valley		Oct 18	Mar 19	May 19	July 19	Aug 19	
	Otago Peninsula			Feb 19	May 19	July 19	Aug 19	Previous plan exists new plan to be prepared
	Saddle Hill / Fairfield / Green Island		Mar 19	June 19	Sept 19	Dec 19	Feb 20	
	Strath Taieri		Feb 19	Apr 19	May 19	June 19	July 19	
	Waikouaiti / Karitane		Oct 18	Apr 19	Jun 19	July 19	Aug 19	
	West Harbour		Dec 18	May 19	Aug 19	Nov 19	Dec 19	