

Budget Initiative: Protecting lakes, rivers and lands from invasive weeds and pests: The LINZ biosecurity programme

Overview and Context

| Key Question/area | Comment/answer |
|---|--|
| Agency to complete | |
| Portfolio of lead Minister | Minister for Land Information |
| Portfolio(s) of other Ministers involved (if this is a joint initiative) | N/A. |
| Votes impacted | Vote Lands |
| Initiative title | Protecting lakes, rivers and lands from invasive weeds and pests: The LINZ biosecurity programme. |
| Initiative description | This funding will protect the values of many iconic lakes, rivers and lands stewarded by the Crown for the benefit of current and future New Zealanders and international visitors. This will involve accelerating existing biosecurity programmes and prioritising key sites to minimise the high risk of major outbreaks and mitigate long-term fiscal impacts. New management measures will include: increased surveillance; better monitoring and evaluation of control activities; and additional control to meet community expectations; and new good neighbour rules. |
| Type of initiative | Non-discretionary cost pressure. |
| If this initiative relates to a priority, please outline the specific priority/ies it contributes to | The initiative does not align with any of the Budget 2019 priorities. However, there may be tangential alignment with the 'Opportunities for productive businesses, regions and iwi to transition to a sustainable and low emissions economy' through avoidance of negative impacts of invasive pests and weeds. |
| Does this initiative relate to a commitment in the Coalition Agreement, Confidence and Supply Agreement, or the Speech from the Throne? | Strong alignment with the Government's general direction on biosecurity (Biosecurity 2025 and its Implementation Plan) and the objectives of The Essential Freshwater Programme. Alignment with the commitment to safeguarding indigenous biodiversity and improving freshwater in the Labour Green Confidence and Supply Agreement and the commitment to protecting and restoring lakes and rivers in the Speech from the Throne. |
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| Responsible Vote Analyst | Alasdair Gardiner : Alasdair.gardiner@treasury.govt.nz |
| Vote Analyst (VA) to complete | |
| Has the portfolio Minister identified at least 1% of current expenditure for prioritisation? | Y/N [See portfolio prioritisation submission template] |
| Overall RAG rating for initiative | Red/Green/Amber [Please colour box accordingly]. |

Funding

| Funding Sought (\$m) | 2019/20 | 2020/21 | 2021/22 | 2022/23 & outyears | TOTAL |
|-------------------------|---------|---------|---------|--------------------|--------|
| Operating | 4.525 | 4.525 | 4.525 | 4.525 | 18.100 |
| Funding Supported (\$m) | 2019/20 | 2020/21 | 2021/22 | 2022/23 & outyears | TOTAL |
| Operating | - | - | - | - | - |

| Funding Sought (\$m) | 2019/20 | 2020/21 | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 | TOTAL |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|
| Capital | - | - | - | - | - | - | - | - | - | - |
| Funding Supported (\$m) | 2019/20 | 2020/21 | 2021/22 | 2022/23 | 2023/24 | 2024/25 | 2025/26 | 2026/27 | 2027/28 | TOTAL |
| Capital | - | - | - | - | - | - | - | - | - | - |

Initiative information

1. Executive Summary

1.1 EXECUTIVE SUMMARY

A. Short summary of the proposed initiative and expected outcomes.

This initiative will fund activities to address threats and risks to New Zealand's iconic lakes and rivers - natural capital highly valued by New Zealanders and international visitors.

LINZ has increasingly been re-prioritising budget from terrestrial to aquatic biosecurity programmes to protect nationally important lakes and rivers. Given increasing cost pressures and current and future risks however, LINZ's baseline for biosecurity is insufficient to match the threats of invasive weeds and pests.

Despite gains in some areas (e.g. Lake Wanaka) we are losing the battle in other areas (e.g. Lakes Benmore and Aviemore). Reprioritisation also means there is less control in important terrestrial areas like the high country and along braided rivers.

The current situation suggests we may have already reached a tipping point:

- It is inevitable that other key lakes, rivers, and lands will be invaded and adversely affected.
- Adequate and consistent funding is essential to enable timely, efficient, and, often, on-going interventions.
- Early intervention is the most cost efficient and effective approach. The invasive nature of weeds and pests means they spread to other areas and can grow exponentially which makes them more difficult and costly to control. LINZ is currently not adequately funded to achieve these early interventions, and is significantly underfunded to undertake costlier interventions later on.

The additional funding will purchase: specialist biosecurity management services and materials, including surveillance, control, scientific monitoring, evaluation, project management, and research and innovation for new control tools; and 2 FTEs – one for procurement and contract management and one for strategic and operational advice.

2. The Investment Proposal

2.1 Description of the initiative and problem definition

What is this initiative seeking funding for?

This cost pressure initiative seeks an increase to the Vote Lands baseline for ongoing weed and pest management on crown lands and waterways. LINZ has had no new baseline funding for biosecurity in over a decade. New funding is needed to address immediate cost pressures and adequately resource LINZ's existing biosecurity programmes to progressively add new control sites and minimise the high risk of major outbreaks and spread of invasive pests and weeds, and mitigate long-term fiscal impacts.

A key component is aimed at risk reduction and managing the threats weeds and pests pose. Money will be used for increased surveillance in high risk and high value sites in order to eradicate or contain new outbreaks as quickly as possible. This early intervention approach delivers the best return on investment as it is more cost effective to remove infestations/populations early.

Funding would deliver additional specialist services including increased surveillance, additional control activities, better monitoring and evaluation of control activities, and investigating and trialling new control tools.

Additional funding will also enable existing biosecurity programmes to be fast tracked which serves two purposes. Firstly, it delivers benefits earlier as goals for each site are reached more quickly. Secondly, quicker

removal reduces the risk of spread to other areas and therefore the extra costs of control.

Some funding is required to address cost pressures associated with increased costs of running an effective biosecurity programme, including additional regulatory requirements of up to \$1million/pa.

Some funding is required for 2 additional FTEs. One for procurement and contract management and oversight of the annual works programme and managing responses to emerging issues. The other for strategic and operational biosecurity advice to ensure LINZ has the in-house capabilities needed to effectively address the threats we face. At present such advice is purchased through contracts and consultants.

All new funding is operational costs as LINZ outsources its biosecurity operations to specialist providers.

This initiative is designed to enable LINZ to continue to effectively carry out its biosecurity functions as manager of Crown lands and waterways and fulfil its role in the biosecurity system. The initiative does not directly align with any of the Budget 2019 priorities. However, there will be tangential alignment with the 'Opportunities for productive businesses, regions and iwi to transition to a sustainable and low emissions economy' due to avoidance of negative impacts of pests and weeds.

Why is it required?

LINZ has management responsibilities for approximately 8% of New Zealand, including many lake and river beds. Each lake has its own unique challenges, and have well-established long-term biosecurity management plans (generally 10-years), setting out vision, goals, and objectives. Formal management groups are in place with agencies, organisations and stakeholders who each have individual roles and responsibilities towards lake outcomes. Representatives on the groups come from MPI, DOC, Regional and District Councils, Iwi, Energy companies and community groups.

Managing invasive weeds and pests is required to protect wellbeing and natural capital

Left unchecked, populations of weeds and pests rapidly build up and can adversely alter the environment, habitats, and wider ecosystems. Exotic pests such as *Lagarosiphon major* out-compete threatened native species and prevent smaller species from growing. Rotting vegetation eventually turns water stagnant and prevents water bodies from sustaining other flora and fauna.

This negatively impacts these waterbodies' ability to support various activities. Economic activities are hampered as these weeds block waterways and dams, effecting drainage and electricity generation. Ecosystem services such as food production, recreation, and flood protection are significantly reduced.

Over time, weed and pest incursions harm the cultural and natural capital of these iconic landscapes. Recreational activities that attract domestic and international visitors and provide significant revenue are disrupted. In the long-term the ability to market these landscapes and their value to international tourists may be reduced.

The cultural wellbeing benefits provided to New Zealanders are significantly reduced when biodiversity and environmental health declines and native species are threatened or prevented from thriving.

Widespread infestations can leave landscapes or water bodies altered for years, in some cases almost permanently due to the difficulty in returning either landscapes or water bodies to their previous states.

Effective management requires adequate and consistent funding

Adequate and consistent funding is needed now to enable timely, efficient, and, often, on-going interventions. The initiative is a response to both increasing cost pressures and increasing risks that could adversely affect New Zealand and New Zealanders.

LINZ has increasingly been re-prioritising budget from land to aquatic biosecurity programmes to protect nationally important lakes and rivers. Adequate and consistent funding is needed now to enable timely,

efficient, and, often, on-going interventions. The initiative is a response to both increasing cost pressures and increasing risks that could adversely affect New Zealand and New Zealanders.

At the current funding levels LINZ will be unable to effectively manage the future risks and impacts of new incursions, emerging threats, and meet the on-going upwards pressure on costs. Furthermore, sufficient funding to enable early intervention is more cost effective than funding reactive responses. It avoids much higher future costs as infestations or populations spread and become denser or higher over time. The Waitaki Lakes case study in the Appendix highlights the importance of early intervention through surveillance and eradication.

Upwards pressure on costs is due to:

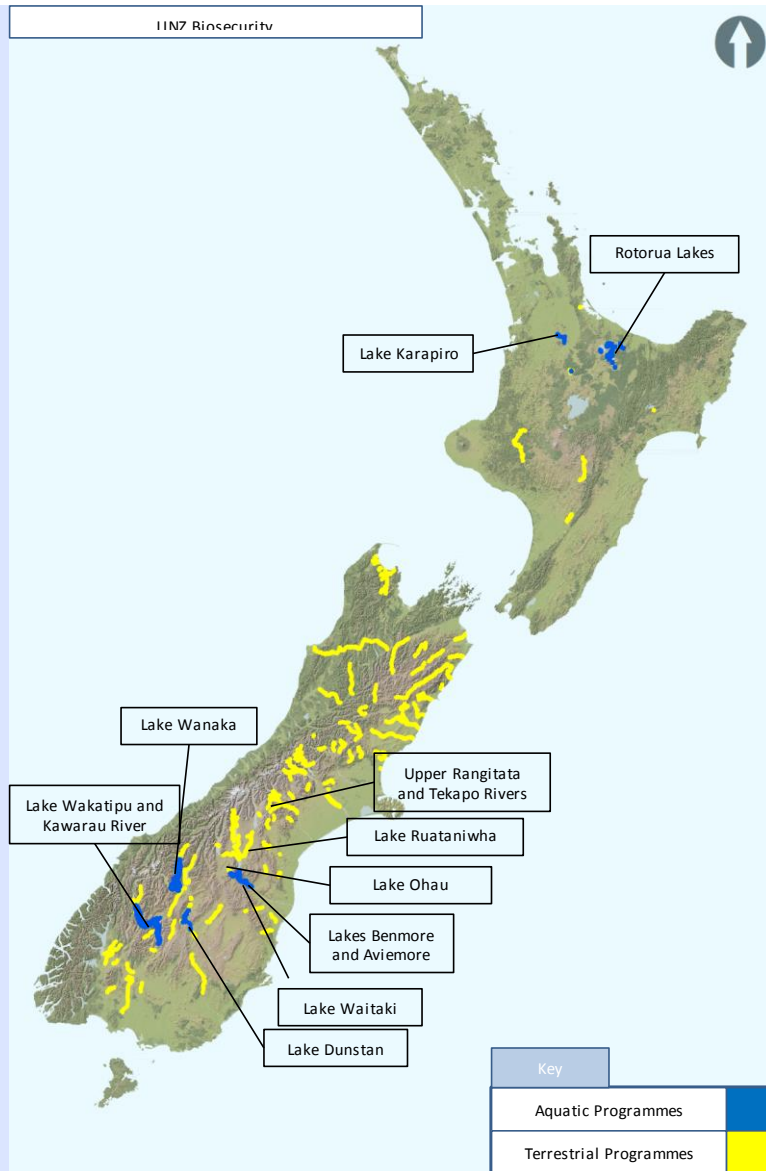
- the increasing scale of existing and new biosecurity threats;
- increased risks of transfer to new sites;
- increasing costs of control, surveillance and monitoring due to inflation;
- the need for more surveillance for early intervention to better manage biosecurity threats;
- new biosecurity regulations including good neighbour rules;
- increasing community expectations for biosecurity controls and/or protection of valued land and water assets.

LINZ has had no new baseline funding for biosecurity in over a decade. The pressure of increasing costs is stretching the existing biosecurity programme to breaking point and jeopardising outcomes. The Waitaki lakes and Lake Wakatipu/Kawarau River case studies in the appendix highlight the consequences of these effects.

The focus of an expanded biosecurity programme to deliver outcomes

With new funding to provide adequate and consistent funding, LINZ will be able to build on the existing biosecurity programme to address in particular the need for additional active management, risks from new incursions and new species, climate change, and obligations from new biosecurity regulations so the crown is well positioned to fulfil its statutory obligations and its role as a good land manager and neighbour. New funding will also enable a greater focus on early intervention and control which is more cost effective as it avoids much higher future costs.

Additional active management - Active management, including surveillance, of high risk pathways, high risk weed and pest species, and high value sites is critical. We currently actively manage many invasive weed and pest species at sites throughout the country (see map below). Additional funding is required to continue to manage legacy pests (gorse, rabbits, wildings etc) and increase our focus on stopping new pests (lupins, wallabies etc) spreading and becoming further established. Significant uncertainties from the effects of climate change present additional risks such as unpredictable growth patterns and unexpected blooms of pest species.



Risks of new incursions - Established weed and pest populations create on-going sources for incursion into new sites. Multiple natural and human pathways for transfer exist, including wind, water, birds, and machinery. The probability of successful transfer and associated risks can increase as pathways and vectors change. For example, tourists and locals enjoying water-based activities are an important transfer pathway for aquatic weeds. More tourists or more local trips between waterways increase the probability of weed transfer (see the Lake Wakatipu/Kawarau River case study in the Appendix as an example of this type of transfer pathway). International visitor arrivals are expected to increase by nearly 37% by 2024, reaching 5.1 million people.¹ Trends suggest that these visitors are likely to continue visiting our iconic lakes and landscapes; for instance, Queenstown has seen a 15% increase in direct flights from international visitors in the last four years.² Each visitor to an area presents a risk of introducing a pest species, and a potential new vector pathway for pests and weeds to spread.

Climate change - Climate change, intensifying natural weather and weather events create significant uncertainties and potential new pathways that can be difficult to predict. For instance, species such as *Lagarosiphon major* bloom from January to March but with warmer and more irregular seasons these periods will become less predictable. Additionally, the plant's stems break easily, especially in rougher weather, and once distributed downstream establish themselves quickly. Once identified, new incursions require a rapid

¹ MBIE, 2018 - *New Zealand Tourism Forecasts 2018-2024*

² StatsNZ, 2018 – *IVA October 2018 Report*

response before they become fully established. Once established, weeds and pests can quickly spread and become exponentially difficult and costly to control.

Risk from new species - Additional risks relate to new threats which are emerging as new species become established or are recognised as a problem. Emerging threats to the LINZ managed Crown estate include fauna such as wallabies and tahr, and flora such as Russell lupins and Asiatic knotweed. Changing environmental conditions, e.g. climate change, makes the receiving environment more (or less) suitable for species to become established.

New biosecurity regulations - Amendments to the Biosecurity Act 1993 arising from the Biosecurity Law Reform Act 2012 have introduced changes which place a greater responsibility on LINZ to manage biosecurity risks on Crown managed lands. In particular, the ability for 'good neighbour' rules to be included in Regional Pest Management Plans which bind the Crown. The rules require LINZ to manage terrestrial weeds and pests to avoid their transfer and ensure protection of biodiversity and production values of adjacent land. Many Regional Councils are including good neighbour rules in the current reviews and updates of their Regional Pest Management Plans. Administering good neighbour rules will cost \$700,000 to \$1M per annum.

Early intervention delivers benefits

Up front investment to enable early intervention is the most cost effective as it avoids much higher future costs as populations increase, and infestations spread and/or become denser / higher over time (Photo A). Costs include degradation of values and wellbeing (amenity, biodiversity, water quality etc.) (Photo B) and/or financial costs of additional control (Photo C).

Photo A: With no control dense mats of lagarosiphon form and will alter lake habitats and ecosystems.



Photo B: Dense mats of lagarosiphon reduce the aesthetic value of clear lake water and create hazards for swimming, boating etc.



Photo C: Costs of control vary depending on factors such as location, species, control methods, and size of infestation.



Control costs are highly variable and depend on various factors including: species, location, biosecurity risk, control methods, impact of no control, and management programme. E.g. control of lagarosiphon in lakes varies from \$1,600/ha to control large areas with diaquat herbicide, to \$10,000/ha for hand removal of isolated plants, to \$60,000/ha for lining with hessian. Note: repeat work is required for methods such as herbicide use and cutting hence costs are ongoing, whereas hand removal permanently removes plants and hessian provides on-going low level maintenance.

Management plan aims and objectives

The aim of each management programme takes into account the extent of invasion / infestation and whether it is possible to achieve the desired control level:

- Exclusion – preventing establishment in new areas through surveillance and controlling transfer pathways e.g. through programmes such as check, clean, dry aimed at aquatic weeds.
- Eradication – permanent removal. Preferred option and as early as possible when the infestation level is low as this is the both feasible and most cost effective option in the long term.
- Progressive containment – containment within a restricted and progressively smaller range. Possible where infestation levels are low enough to be reduced. Costs vary depending on species, scale and density of infestation, controls methods etc. and will decline over time as containment is achieved.
- Sustained control – on-going control or suppression to reduce impacts and spread where eradication is not possible / has not been achieved. Costs vary as above but will be ongoing in order to hold populations at current levels.

More investment in preventing spread – more efficient and effective

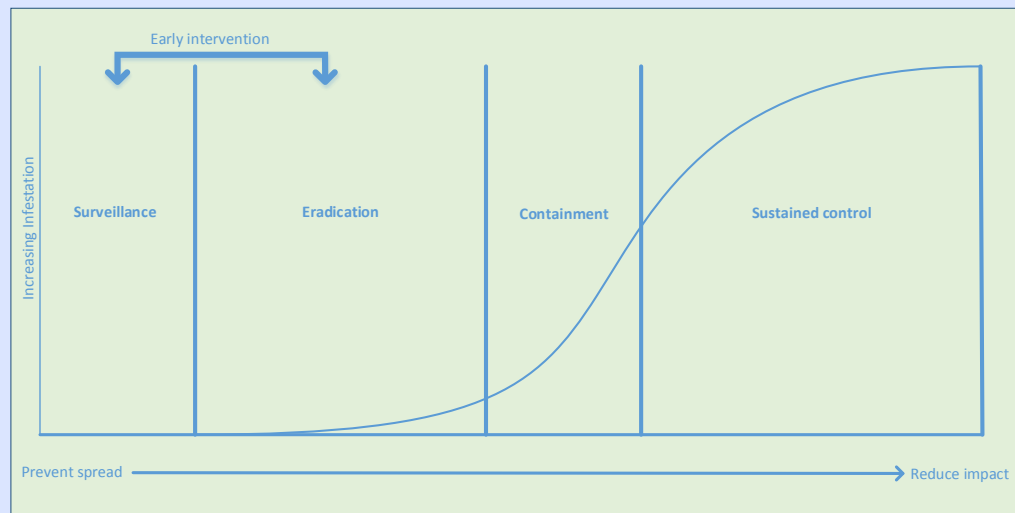
This investment would enable improvements in control effectiveness and efficiency by enabling more focus on preventing spread and through intense activity to knock down populations to more manageable levels. Specifically, for different programmes:

- More surveillance (increased frequency and number of sites) to prevent establishment (Exclusion Programme) and enable early detection and control to increase the probability of early eradication of new incursions (Eradication Programme). Outcome sought – preventing spread. See the Waitaki Lakes case study in the Appendix as an example of the critical importance of such early intervention.
- Additional control activities to advance existing programmes focussed at progressively containing a species (Progressive Containment Programme). Outcome sought: smaller geographic distribution. See the Lake Wanaka case study in the Appendix as an example of where this approach is working well.
- Additional control activities for on-going suppression of the species (Sustained control Programme). Outcome sought - reduced impacts on values and spread to other properties – the focus of good neighbour rules.

- Additional control activities in some areas with high community values/expectations where weeds and pests are widespread/entrenched hence eradication is highly unlikely (sustained control).
- Better monitoring and evaluation of control activities to maximise efficiency and effectiveness.
- Trialling of new control methods and new techniques for monitoring and surveillance.

Management options based on pest and weed incursion levels

As rates of infestation increase, LINZ must undertake more resource-intensive activities to reduce the impact of pest incursions. However, earlier interventions ensure infestation rates remain low and therefore are much more cost-effective.



This approach would maximise the return on investment by delivering cost efficiencies and savings through early intervention to be reinvested in new control sites. The combination of early intervention and expanding areas under active management will deliver better outcomes by avoiding negative impacts.

More information on site specific prioritisation and objective setting is provided in section 2.3.

2.2 Options analysis and fit with existing activity

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| <p>What other options were considered in addressing the problem or opportunity?</p> | <p>Phasing, scaling or delaying the budget bid was considered. These options are outlined in section 4.1 below. There are no other practical means to address these biosecurity risks than the methods proposed by this initiative.</p> |
| <p>What other similar initiatives or services are currently being delivered?</p> | <p>LINZ has a well established biosecurity programme. A long term control and biosecurity programme is developed for each lake / river / site. Management plans formalise collaborative arrangements with partner agencies (e.g. DoC, MPI, regional councils), iwi, organisations (e.g. hydro-electricity generators, community / philanthropic groups) and stakeholders. These arrangements, which include additional funding and/or volunteer in-kind support, enable coordination of weed and pest management activities. See the Lake Wanaka case study in the Appendix as an example of successful partnership. Adequate and consistent funding from the Crown / LINZ is critical to enabling these partnerships and delivering more efficient and timely interventions.</p> |
| <p>What other, non-spending arrangements in pursuit of the same objective are also in place, or have been</p> | <p>Amendments to the Biosecurity Act (1993) arising from the Biosecurity Law Reform Act 2012 now make the Crown bound by those rules explicitly identified as Good Neighbour Rules in regional pest management plans (RPMPs). Regional Councils are now reviewing and updating RPMPs and including rules to address boundary issues with Crown land which requires the Crown to undertake additional control. In addition, new pest and weed species (e.g. wilding conifers, Russell lupins) are being included which also requires the Crown to undertake additional control.</p> |

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| proposed? | |
| Strategic alignment and Government's priorities/direction | <p>LINZ's new strategic direction recognises the environmental, social, cultural, and economic values of the Crown estate it manages. Making best use of the Crown estate is one of four outcomes in LINZ's <i>Outcomes Framework (2017-2027)</i>. The intention is that land the Crown is responsible for is assessed, sustainably managed and allocated to its best use to deliver government priorities, outcomes for Māori, and benefits for all New Zealanders. The outcomes framework notes the need for operational data, analysis, and intelligence to make sound management decisions. Effective biosecurity control is an important component of sustainable management and quality surveillance and monitoring data is required to support it.</p> <p>LINZ's <i>Four Year Plan 2017 – 2021</i> outlined future biosecurity cost pressures. Including the <i>National Policy Direction for Pest Management</i>, which necessitates additional resourcing to ensure LINZ is fully compliant with the good neighbour provisions of Regional Pest Management Plans as they are reviewed. The Plan estimated costs of \$1million per annum to address this, and noted additional funding may be needed in the future to meet LINZ's obligations.</p> <p>The initiative has a strong alignment with the Government's general direction on biosecurity (Biosecurity 2025 and the Biosecurity 2025 Implementation Plan) and the objectives of <i>The Essential Freshwater Programme</i> (stop further degradation and loss, and reverse past damage). It also aligns with the CPC outcome area of 'An economy that is growing and working for all of us' and its reference to "Our unique biodiversity will be protected by investing in pest eradication, lifting the quality of freshwater and other measures".</p> <p>The initiative does not strongly relate to any of the Budget 2019 priorities. There may be tangential alignment with the 'Opportunities for productive businesses, regions and iwi to transition to a sustainable and low emissions economy' due to avoidance of negative impacts of pests and weeds. However, this initiative is designed to address non-discretionary cost pressures, rather than aligning directly to budget priorities.</p> |

2.3 Implementation, Monitoring and Evaluation

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| How will the initiative be delivered? | <p>LINZ will be responsible for delivering the initiative using the existing governance and management processes that are well established for the delivery of pest and weed control programmes on Crown lakes, rivers and land. On-the-ground biosecurity management will be carried out by LINZ's existing biosecurity management specialists (Boffa Miskell Ltd), in conjunction with NIWA and other service providers and operators as required. Sufficient capacity for additional work currently exists within these service providers.</p> <p>Following confirmation of additional funding, LINZ and its biosecurity specialist (Boffa Miskell Ltd) will confirm the prioritisation of funding for each existing control programme. Priorities for weed and pest control include national priority species, species requiring control under Regional Pest Management Plan rules, species affecting adjacent land, projects covered by collaborative arrangements with other agencies and community groups, and protection of areas of high biodiversity, amenity and recreation values.</p> <p>Prioritisation will also be informed by the objectives of any current management plan, the monitoring results of control works over previous years, and engagement with key stakeholders such as DoC, regional councils, other agencies (e.g. Defence), organisations, and the community as appropriate. Annual control plans for control activities for the following year will then be developed and implemented. The outcomes of control will be monitored and inform priorities and the development of the annual control plans for the following year/s.</p> <p>The overall timeline for delivery is difficult to determine as it is dependent on how each river, lake or land area responds to management activity over time, and whether any new incursions occur which require a management response to be initiated. Responding to new incursions takes priority and necessitates diverting funding from, and slowing down, existing programmes. As each programme achieves its goals,</p> |
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| | <p>spending would reduce to maintenance levels, enabling budget to be re-allocated to other LINZ biosecurity areas in response to changing threats and management priorities.</p> |
| <p>How will the implementation and performance of the initiative be monitored?</p> | <p>Implementation and performance of the initiative will be regularly monitored using the existing management processes that are in place for the delivery of individual pest and weed control programmes and the overall biosecurity programme. For example, for aquatic weed:</p> <ul style="list-style-type: none"> • The outcomes of annual control works will be monitored to determine progress against the goals, objectives, and milestones in the lake management plans. This will inform the development of subsequent annual control plans to ensure weed control is appropriately targeted year to year. • Where new incursions occur, specific response action plans will be put in place to eradicate weeds rapidly within a set timeframe. On-going monitoring will ensure no relapse occurs, or is quickly responded to. Results from surveillance plus incursions in non-surveyed areas will be used to evaluate the effectiveness of the surveillance programme. • Regular engagement with regional councils, other agencies, organisations, and the community through existing arrangements under the lake management plans will gauge levels of support for control activities. And provide a forum to address any issues or concerns raised that may affect on-going implementation. |
| <p>Describe how the initiative will be evaluated</p> | <p>The impact of the initiative will be evaluated by LINZ against the current state of pest and weed coverage in Crown rivers, lakes and land, and the achievements of monitoring indicators:</p> <ul style="list-style-type: none"> • The goals, objectives, and milestones specified in the current management plans and control programmes are achieved. • Pest and weed incursions in new sites do not occur, or are rapidly eradicated. • Continued or increased support of partner agencies and organisations. • Positive community feedback and on-going support for control activities. <p>Although this initiative focuses on avoiding impacts, it is not proposed to evaluate against the counterfactual as it is not possible to:</p> <ul style="list-style-type: none"> • Accurately predict pest and weed coverage due to the multiple transfer pathways and the complexity of species biology, habitats, and ecosystems. • Effectively assess how site values, people's wellbeing, and natural capital has been protected. |

3. Wellbeing Impacts and Analysis



3.1 Summary of outcomes

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| <p>Overall outcomes expected from this initiative</p> | <p>All New Zealanders will be impacted by this initiative. By actively managing invasive weeds and pests this initiative aims to prevent the degradation of the natural capital of Crown land and waterways maintaining its value for current and future generations. Through active management, pest and weed populations will be reduced or, where possible, eradicated.</p> <p>Reducing infestation levels and, therefore, the impacts of pests and weeds will reduce or avoid costs to a range of environmental, social, cultural, and economic values that are important to the wellbeing of New Zealanders, and international visitors, and customers/consumers. E.g:</p> <ul style="list-style-type: none"> • Amenity values; landscape / clean green image values; and mahinga kai and mauri that underpin our passion for the outdoors and kaitiakitanga / environmental stewardship responsibilities – important components of the New Zealand cultural identity (cultural identity wellbeing domain). • Quality environments and habitats, and functioning ecosystems that underpin New Zealand's natural capital and the goods and services (ecosystem services) it provides (environment wellbeing domain). <p>Specific New Zealanders will be impacted in other ways depending on how pest and weed control protects the ecosystem services most important to their wellbeing. This could cover a range of wellbeing domains e.g. the health of individuals who row at Lake Karapiro, boat on Lake Wakatipu, or swim in Lake Dunstan; the income of tourist providers providing jet-boating, water skiing and other activities on Lake Wakatipu and other lakes.</p> <p>Without this initiative, given the cost pressures and increasing risks, and the impact on LINZ's existing biosecurity programme some values on the Crown's land and waterways will be degraded with a knock-on decline in wellbeing and natural capital.</p> |
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3.2 Wellbeing domains – People's experience of wellbeing over time


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| <p>Identify and quantify how the initiative impacts on wellbeing domains</p> | <p>See table below.</p> |
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3.2 Wellbeing domains – People’s experience of wellbeing over time

| Domains | Impact(s) description | Who are affected? | Magnitude of impact | How big? | Realised in | Evidence base | Evidence quality |
|---|--|--|--|---|---|---|------------------|
| Environment  Primary | Reduced costs to/impacts to habitats (e.g. for native plants and animals) and ecosystems (e.g. abundance and diversity of plants and animals). | NZ plants and animals, and ecosystems. New Zealanders and international visitors; and businesses and customers / consumers who all benefit from ecosystem services that are protected. | Magnitude of impact will vary depending on: <ul style="list-style-type: none"> Location / site values –quality of environment / habitat, ecosystem, ecosystem services Size of risk reduction in terms of real world impact and/or fiscal risk to the crown. E.g. magnitude will be high where interventions eradicate: <ul style="list-style-type: none"> Weeds and pests infesting internationally recognised braided rivers altering habitat and ecosystems and threatening already rare species such as kaki (black stilt). Extensive infestations of hornwort which can impede water flow in irrigation and drainage channels and block hydro-generation intake screens causing outages and shutdowns. Species such as wilding conifers. | Depends on sum of multiple values for each site and the number of New Zealanders who are affected. Not possible to quantify since benefit is avoidance of impact and degradation of wellbeing and natural capital. Not monetised. | <5 years – 10+ years depending on location / site as benefits accrue over time once increased management commences. | Assumptions: All New Zealanders and international tourists benefit directly or indirectly from Crown lands and waterways through the ecosystem services they provide. Individual New Zealanders place particular value on specific sites and/or ecosystem services and demonstrate a willingness to pay to protect them (E.g. aquatic weeds in Waikato). Bell, B., Yap, M., Cudby C. 2009. Assessing the marginal dollar value losses to a freshwater lake ecosystem from a hypothetical aggressive weed incursion. Report to Biosecurity New Zealand on valuing the freshwater environment. <i>Report to Biosecurity New Zealand</i> . http://www.nimmo-bell.co.nz/pdf/forst/WP10Freshwatertechreportfinal.pdf Others in the biosecurity system play their part in managing risks that impact on Crown lands and waterways. Active management and controls, particularly collaborative approaches, continue to be effective. E.g. NIWA 2016, <i>A Ten Year Lagarosiphon Management Plan for Lake Wanaka: 2016-2025</i> . Increasing number of sites meet eradication or progressive containment goal. On-going reprioritisation of effort towards next priority sites as control goals reached. Costs will be on-going in some locations given scale and intractability of overall | Moderate to High |
| | Reduced cost/negative impact due to changes to biophysical environment (e.g. lakes, agricultural land), the associated ecosystem services (e.g. flood protection, food/fibre production) and economic benefits (tourism, agriculture). | Local and central government agencies that would be required to respond to negative impacts. | | | | | |
| | Avoid costs of changes to physical environment (e.g. siltation and hydrology) and associated ecosystem services (e.g. flood protection, hydro-generation). | | | | | | |
| Cultural identity  Secondary | Reduced cost / negative impact on amenity values and leisure activities (e.g. water sports, bushwalking), disruption of activities, risk of accident, injury or death from entanglement in aquatic weed. | Individuals and groups involved in activities. Individuals and families who would be negatively impacted by adverse events – accidents, injury, death – and health system. Volunteer and professional bodies hosting events. | Magnitude of impact will vary depending on: <ul style="list-style-type: none"> location / site values importance to community / stakeholders size of risk reduction in terms of real world impact and/or fiscal risk to the crown. E.g. hornwort is not present in the south island but is abundant in north island lakes. Lakes Karapiro (N. Island) and Ruataniwha (S. Island) are used for community, national, and international rowing events. Avoiding incursion and establishment of hornwort in L. Ruataniwha through transfer from L. Karapiro via rowing equipment would be very high impact (see Lakes Karapiro and Ruataniwha case study in the Appendix for details on managing this high value, high risk situation). | Depends on sum of multiple values for each site and the number of New Zealanders who are affected. Not possible to quantify since benefit is avoidance of impact and degradation of wellbeing. Not monetised. | | | |
| | Avoid costs to iconic landscapes / clean, green image – aesthetics, subjective wellbeing etc. | New Zealanders with strong affiliation to landscape / places and/or the clean green image. | | | | | |
| | Reduced cost / negative impact on to mahinga kai – access and availability. | Māori / iwi especially from that rohe. | | | | | |
| | Reduced cost / negative impact on mauri (life force) of land and water. | Māori / iwi especially kaitiaki. | | | | | |

3.3 Wellbeing capitals – Sustainability for future wellbeing

| | |
|---------------------------|------------------|
| Wellbeing capitals | See table below. |
|---------------------------|------------------|

|  Capitals | Describe the impact and its magnitude | Realised in <5 / 5-10 / 10+ years |
|---|---|--|
| Financial/Physical | <p>Decrease financial: draws down financial capital to fund additional biosecurity control on crown lands and waterways.</p> <p>Maintain physical: maintains physical capital of some infrastructure, e.g. hydro-generation, irrigation and drainage channels, water-based tourism / recreation equipment (boats etc.) by protecting them from degradation caused by weeds.</p> | <p><5 years as the cost is immediate.</p> <p><5 years – 10+ years depending on location as the benefits accrue when increased management begins.</p> |
| Human | <p>Maintain or increase: By keeping more high value recreational sites (e.g. boat ramps, swimming places) clear of pests and weeds, this initiative will provide recreational opportunities that can help maintain and increase the physical and mental health of people who use them.</p> | <p>10+ years as the impact of maintaining health is incremental and small.</p> |
| Natural | <p>Maintain or increase: By actively managing invasive weeds and pests, this initiative aims to reduce or avoid costs to / impacts on the environment and the ecosystem services we derive from it. This will help prevent degradation of the natural capital of Crown lands and waterways maintaining their value for current and future generations. Investing sooner will increase the overall impact on the capital.</p> | <p><5 years providing management is ongoing, as the impact of avoidance is immediate.</p> |
| Social | <p>Maintain or increase: By partnering directly and indirectly with New Zealanders to undertake pest and weed control, this initiative will contribute to maintaining or increasing both social networks and norms regarding New Zealanders as kaitiaki / environmental stewards and outdoors oriented. Investing sooner will increase the overall impact on the capital.</p> | <p><5 years – 10+ years depending on location as the benefits accrue when increased management begins.</p> |

3.4 Risk and resilience narrative

| | |
|--|--|
| Does the initiative respond to or build resilience? | <p>Risk: By enabling a more comprehensive and proactive biosecurity programme aimed at early intervention and progressive containment and eradication, this initiative would reduce risks associated with the spread and increase of invasive weeds and pests. See section 2.1 for an overview of the risks and how they can be reduced through upfront investment and early intervention.</p> <p>Resilience: Pest and weed control can also maintain or enhance resilience in dealing with natural hazards, particularly changes in the frequency and severity of extreme events (heavy rainfall, floods, and droughts) caused by climate change. For example, removal of dense beds of</p> |
|--|--|

lagarosiphon in the Frankton Arm of Lake Wakatipu will avoid the flow of floodwaters exiting the lake into the Kawarau River being impeded. Left unchecked, these lagarosiphon beds could lead to a higher lake level, and contribute to the inundation of Queenstown. Similarly, removal of wilding conifers avoids the interception of water required to sustain functioning, productive natural and agricultural ecosystems.

Counterfactual: With no additional funding existing and new risks will continue to increase. It will mean:

Scaling back of the existing biosecurity programme - increasing costs will mean scaling back the existing biosecurity programme, thereby increasing the existing risks of incursion, establishment, and spread. It will also mean slower progress towards outcomes.

Increased probability of transfer to new sites - increasing activity in some weed and pest pathways (e.g. water-based recreation) increases the probability of transfer to new sites.

Increased difficulty and cost of control - once established, weeds and pests become exponentially difficult and costly to control which puts additional pressure on the existing biosecurity budget and the overall programme. At some point, there will be a **critical** need for additional funding.

Failure to meet community expectations – including collaborative arrangements with other agencies / groups.

Dealing with climate change - climate change creates known risks to biosecurity management that will need to be addressed. Exactly what this will mean is unclear. What is known, is that pest and weed species are highly adaptive and likely to respond quickly to environmental changes.

4. Costings

This initiative is for operating costs. The split of costs is outlined in the table below.

4.1 Detailed funding breakdown

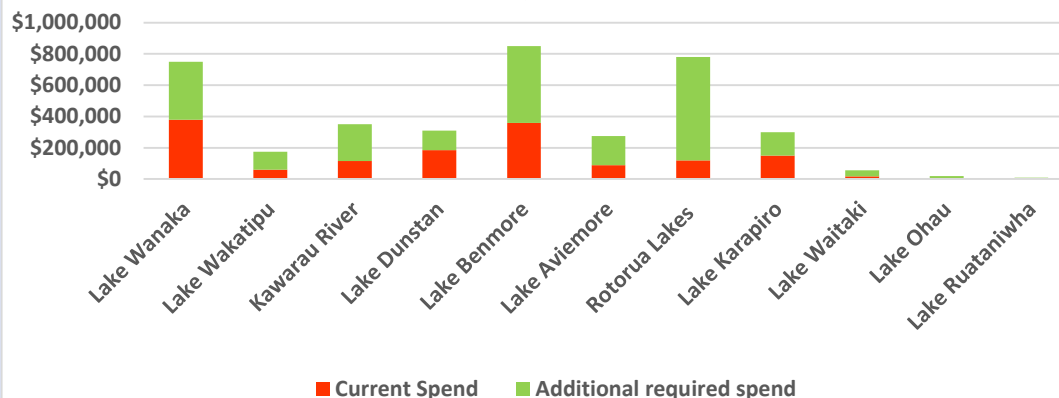
| Please provide a breakdown of the costs of this initiative | | | Funding estimate (2019/20) \$ | Outyears | Actual spend 2017/18* |
|--|--|--|-------------------------------|------------------|-----------------------|
| | Activity | Brief Description | | | |
| | Aquatic Weed Control | Increasing weed control in lakes and rivers. Focus on high risk species: Lagarosiphon, Hornwort, Egeria. Control is situation dependent and includes helicopter and/or boat based spraying of herbicide for dense infestations (\$1,600 per ha) and boat based cutting, hand weeding by divers, laying biodegradable hessian barrier mats for ongoing low level maintenance (\$60,000 per ha)**. | 2,400,000 | 2,400,000 | 925,000 |
| | Terrestrial Weed and Pest Control | Increasing weed and pest control on crown lands including intervention on pastoral lease land if needed. Focus on existing high risk species: Gorse, Broom, Nasella, Wildings, Old Mans Beard, Lupins, Rabbits, and emerging threats including Wallabies and Tahr. | 750,000 | 750,000 | 950,000 |
| | Surveillance, Monitoring and evaluation | More surveillance (e.g. 2-3 times a year) is critical to early detection of new incursions. More control activities requires more monitoring to evaluate effectiveness and the need for follow-on action. Costs are site and species dependent and include use of helicopters / boats / divers. | 500,000 | 500,000 | 150,000 |
| | New Control tool innovation | Investigating and trialling new tools to reduce costs and improve efficacy. | 250,000 | 250,000 | NIL |
| | Programme Management and non-control works | Biosecurity programmes management advice and oversight of operational programme (Boffa Miskell - biosecurity specialists) LINZ non-control specific works. | 250,000 | 250,000 | 1,000,000 |
| | Additional FTE | 2x FTE (1 for procurement and contract management/oversight + 1 for strategic and operational advice) | 375,000 | 375,000 | N/A |
| | Total | | 4,525,000 | 4,525,000 | 3,025,000 |

*Excludes third party funded control work \$500K.

**Repeat work is required for methods such as herbicide use and cutting hence costs are ongoing, whereas hand removal permanently removes plants and hessian provides effects, ongoing low level maintenance.

The graph below and the appendix provide a lake by lake overview of how additional funding would be allocated in the first 2-3 years. See section 2.3 for details on programme design which is based on site values, biosecurity risks, and control programme cost : benefits.

LINZ Aquatic Weed Control: Current vs Additional Spend



The operating costings assume:

- LINZ is able to continue to purchase all specialist biosecurity services required (currently Boffa Miskell Ltd, NIWA, and a range of smaller highly specialist providers).
- No significant increases in the LINZ managed Crown estate (e.g. addition of large areas of land with serious weed and pest problems).

4.2 Options for scaling and phasing

Scaling, phasing or deferring

Since it is an increase to baseline to enable an existing biosecurity programme to address a range of cost pressures and take a more cost-effective early investment approach, this initiative can be phased, scaled or deferred. LINZ can adjust the existing biosecurity programme to suit any option. However, given the scale and intractability of New Zealand's biosecurity problems there will be ongoing need for a biosecurity programme on the Crown's lands and waterways. Additional upfront investment will reduce, but not entirely remove, some of the real world risks / impacts and financial risks to the crown.

Scaling or phasing are not preferred options. They would address the immediate needs of existing cost pressures and funding for the highest priority sites, and enable more surveillance, a key component of an early intervention approach. However, slower progress could be made in advancing the existing programmes through additional control to enable progress towards less costly maintenance control.

Deferring the budget until 2020 is possible, but not recommended as this means the Crown takes on more risk now and will need to fund the consequences later. At some point the squeeze on LINZ's biosecurity budget will become critical as an increasingly constrained biosecurity programme will shift more and more costs to future.

What would be delivered if this initiative was scaled to 75% and 50%, respectively

Under both a 75% and 50% scenario LINZ would deliver:

- Control actions to remove aquatic weed and address the current critical situation in some high priority lakes.
- Increased surveillance and monitoring, in particular for aquatic weeds, to enable early intervention.
- Control actions required to meet new regulatory requirements to ensure the Crown is a good neighbour and steward.

- Less control work at non-critical sites which would result in slower progress towards achieving less costly maintenance control.
- Reduced in-house capability for strategic and operational advice as this function would be scaled back and would need to focus on scoping advice to be procured on an as needed basis. Although a pragmatic approach to funding, continued reliance on external advice would mean LINZ is less able to get the best from its biosecurity programme.

5. Collaboration

| 5.1 Collaboration and evidence | |
|--|---|
| What type of cross agency initiative is this? | This is not a cross agency and/or cross portfolio bid but there are cross agency implications to consider since other agencies (the Department of Conservation, Ministry for Primary Industries) and regional councils have related biosecurity responsibilities. |
| Agencies and Ministers that have been engaged in initiative development | <p>We have established partnerships and collaborative operational programmes with all key government agencies with statutory biosecurity interests (Department of Conservation, Ministry for Primary Industries) and regional councils across New Zealand.</p> <p>The agencies and key regional councils have expressed support for additional funding for LINZ's biosecurity programme. Most agencies agree that LINZ is currently under-resourcing its biosecurity work.</p> <p>Relevant Ministers have not been briefed since this initiative relates to additional funding to expand an existing biosecurity programme on LINZ managed lands.</p> |
| Impact of cross agency collaboration | This initiative has been shaped, in part, by the existing and proposed biosecurity collaborations and control programmes and discussions that LINZ is actively involved in, including the national wilding conifer control programme, feral goat, rabbit and other collaborative terrestrial weed control programmes with DoC and Regional Councils, and proposals for additional control of wallabies (budget bid). These all highlight the need for increased and joint efforts and emphasise the risks of lack of funding for LINZ's biosecurity programme. Most importantly, control of aquatic weeds in lakes and rivers LINZ manages on behalf of the crown. LINZ has main responsibility for control of aquatic weeds and through partnerships is able to leverage additional funding from others including local councils, hydro-electricity generators, and philanthropists. This initiative primarily aims to address the cost pressures and increasing risks around aquatic weeds. Doing so will enable LINZ to meet its increasing obligations for controlling terrestrial pests and weeds. |
| Risks and challenges | No key risks or challenges have emerged. The current focus on biosecurity and collaborative efforts to address issues provide opportunities to coordinate resources and get better results. |

Appendix: The LINZ biosecurity programme case studies

Waitaki Lakes

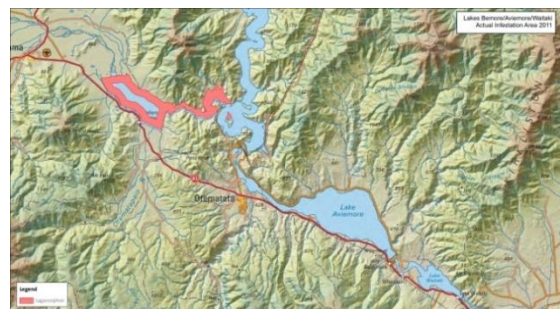
Priority for investment: Surveillance and eradication programmes to contain spread and further invasions in Waitaki lakes

Lagarosiphon was detected in Lake Benmore in 2003. By 2011 lagarosiphon had spread through Lake Benmore's Ahuriri Arm and Neck. At that time \$250,000 was being spent on control work which included herbicide spraying and diver-based removal. A progressive containment programme was put in place to ensure that the downstream receiving waterbodies (Lakes Aviemore and Waitaki) remained free of the weed. In 2014 an additional \$300,000 was invested get on top of the weed's exponential growth.

In 2017 surveillance showed lagarosiphon had spread downstream through the Benmore Dam and into Lake Aviemore. In 2018, surveillance showed spread far beyond the initial incursion area. Considered critical given the increasing threat lagarosiphon now poses to the lakes, LINZ is re-prioritising an additional \$100,000 this year on top of the annual budget of \$360,000. To accommodate this additional control work, programmes at other locations will be scaled back.

By 2025, without the extra control measures additional funding would enable, we anticipate that lagarosiphon will have invaded parts of Lake Benmore currently free of weed. Lagarosiphon will be fully established in Lake Aviemore, and Lake Waitaki. Such extensive infestations will negatively affect a range of values including recreation, hydro-electricity generation and biodiversity (see section 3.2 for more information). Whilst redirecting funding from other biosecurity programmes is possible, it would have adverse consequences either slowing down progress or reversing the gains already made.

Lagarosiphon distribution 2011



Lagarosiphon distribution 2018



Anticipated distribution 2025 (no additional funding)



Lake Wakatipu and Kawarau River

Priority for investment: Progressive containment and eradication programmes to manage transfer pathways and avoid new incursions into Lake Wakatipu

In 2011 the extent of lagarosiphon in the Kawarau River was minimal. In 2014 surveillance in Frankton Arm was showing an increase in lagarosiphon incursions. However, concerns over responsibilities and the suitability of control methods led to delays in control work.

Lagrosiphon distribution 2011



By 2018 lagarosiphon was established in the river and significant infestations were detected and removed in Lake Wakatipu. Tourism and recreation are a key pathway for transfer of weed from the river to the lake. Spread is largely caused by boating - jet-boats for tourism and individual boats for private use - which inadvertently collect weed and deposit it in the lake. Increasing boating activities increases the risk of transfer. To address these risks, LINZ partners with and supports Queenstown Lakes District Council, MPI, Otago Regional Council and others in community awareness-raising of the check, clean, dry programme. In addition, LINZ and Otago Regional Council are partnering to provide additional funding to remove willows from the Kawarau River. Willows make lagarosiphon control more difficult and costly; hence their removal is important for successful control.

Lagrosiphon distribution



By 2025, with additional funding and the control methods now available, we expect lagarosiphon in the Kawarau River will be eradicated, preventing its spread to Lake Wakatipu. On-going regular surveillance will be important in managing risks of any future infestations.

**Anticipated distribution 2025
(with additional funding)**



Lake Wanaka

Priority for investment: Lake Wanaka – leveraging partnerships to continue gains in progressive containment

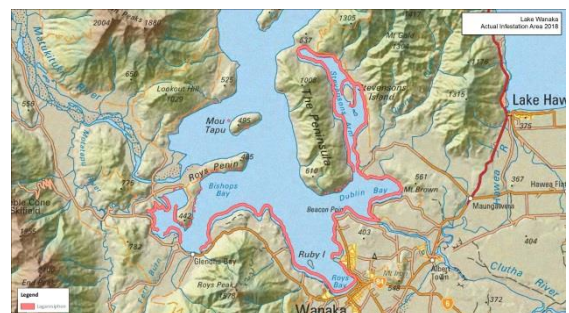
Lagarosiphon has been actively controlled in Lake Wanaka since 2005. In 2011 a joint programme of work had been established by LINZ, Otago Regional Council, Queenstown Lakes District Council, the Department of Conservation and Lake Wanaka Guardians. LINZ contributed \$300,000 pa to the work. The strategy was to eradicate lagarosiphon from the top two-thirds of the lake, and progressively contain it through the lower third.

Lagarosiphon distribution 2011



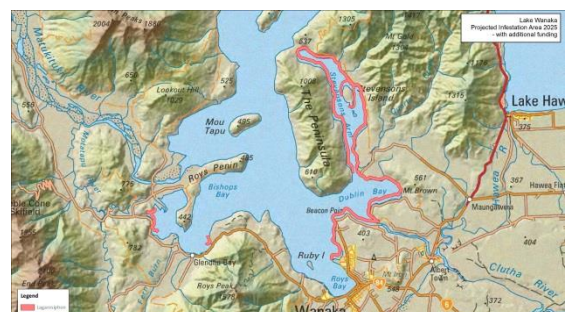
By 2016 the success of the programme attracted funding of \$50,000 from a local philanthropist. The agencies also started contributing more. LINZ's contribution is now \$380,000 pa. The additional investment has contributed to the management goal of maintain gains made in lagarosiphon removal within the eradication zone.

Lagarosiphon distribution 2018



By 2025, with additional funding it would be possible to advance the programme significantly further restricting lagarosiphon within the containment area. Such containment would also reduce the risk of lagarosiphon being transferred from Lake Wanaka to other lakes in the district.

Anticipated distribution 2025 (with additional funding)

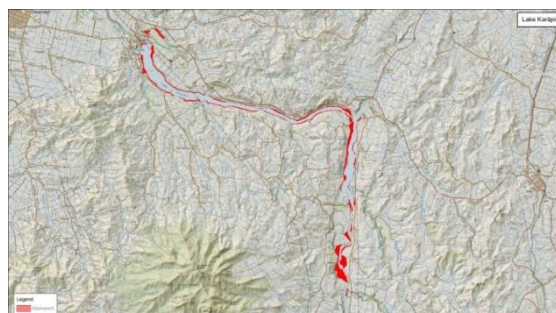


Lake Karāpiro and Lake Ruataniwha

Priority for investment: Lake Karapiro and Lake Ruataniwha – managing nationally important high impact risks and protecting high values

Recognised internationally, Lake Karapiro is a multi-use lake with intrinsic, cultural, environmental, recreational, sporting (the base for Rowing New Zealand and Waka Ama) and utility values (e.g. hydro-power generation and water takes). These values are threatened by extensive and persistent hornwort weed beds and the drifting weed that floats downstream.

Hornwort distribution 2018



Risks of transfer between North and South Island

Hornwort is designated as an Unwanted Organism under the National Plant Pest Accord (NPPA) and is therefore banned from sale and distribution under the Biosecurity Act (1993). It is also a National Interest Pest in the South Island, requiring an eradication response for any new incursions. There is risk of transfer of hornwort to the South Island, particularly Lake Ruataniwha and other rowing venues. Uncontrolled hornwort around boat ramps, jetties and other infrastructure in Lake Karāpiro increases the risk of equipment contamination and transfer.

Impact of hornwort on values and wellbeing

Large beds of canopy-forming weeds have been associated with depressed quantity and quality of boating, water skiing, swimming and near-shore recreation (NIWA, 2016). Dense mats of weed provide good habitat for the snail hosts of parasites that cause 'swimmer's (duck) itch' (Eiswerth et al. 2000). Entanglement and drowning have been linked to invasive weed beds (Getsinger et al. 2014), with a near drowning at Lake Maraetai in December 2014 being attributed to an uncontrolled weed bed.

Managing hornwort - protecting values and reducing risks

The goals of the Weed Management Plan for Hornwort in Lake Karāpiro 2016 to 2025 are aimed at protecting the lake's values:

- the mauri (health, wellness and cultural values) of the river;
- amenity, recreation and sporting values; utility values;
- sustainable management of hornwort impacts (long-term, cost efficient, and effective), and
- managing the risk of weed spread to other water bodies.

Hornwort has been detected in the South Island twice, in 2002 and 2006. Given hornwort's status as a National Interest Pest in the South Island, such incursions trigger a national biosecurity response led by MPI. Early detection and eradication of new incursions is crucial

to avoid the possibility of permanent and widespread establishment and on-going impacts and costs seen in the North Island.

Supporting the World Rowing Championships – protecting values

The high value to New Zealand and New Zealanders of the 2010 World Rowing Championships at Lake Karāpiro required a significant focus on hornwort management. The scale of weed control had to be substantially increased to meet the demands of zero weed interference during the event. Diquat herbicide was assessed to be the only cost effective (\$2,000/ha) option available, considering the scale of control required 50-100 ha. Although harvesting is effective, it can be used to target small-scale areas only at a cost of \$10,000/ha.

Preventing transfer of hornwort to South Island lakes – reducing risks

There is considerable movement of people and equipment between the North and South islands for recreational and competitive sport purposes. Activities are both individual recreational and organised recreation or competitive club-based. Tourists also provide a potential risk of inter-island transfer of hornwort.

The targeting of waterway user groups via the Check, Clean, Dry campaign has improved awareness. Awareness raising will be included in future biosecurity operations. Stop The Spread information boards located at sites such as boat ramps are a key part of the Check, Clean, Dry campaign aimed at preventing the spread of aquatic weeds

Stop the Spread information board: biosecurity control at Lake Ruataniwha



References

Boffa Miskell (2018). Readiness and Response Plan for Hornwort invasion of South Island Lakes and Waterways (Draft). Prepared for LINZ.

NIWA (2016). Weed Management Plan for Hornwort in Lake Karāpiro 2016 to 2025. Prepared for LINZ on behalf of the Lake Karapiro Aquatic Weed Management Group.

Protecting lakes, rivers and lands from invasive weeds and pests: The LINZ biosecurity programme

