Nelson City Council
te kaunihera o whakatū

Ordinary meeting of the

Environment Committee

Kōmiti Taiao

Date:	Thursday 28 November 2019
Time:	10.00a.m.
Location:	Council Chamber, Civic House 110 Trafalgar Street Nelson

Attachments under Separate Cover

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REPORT NO. 3015

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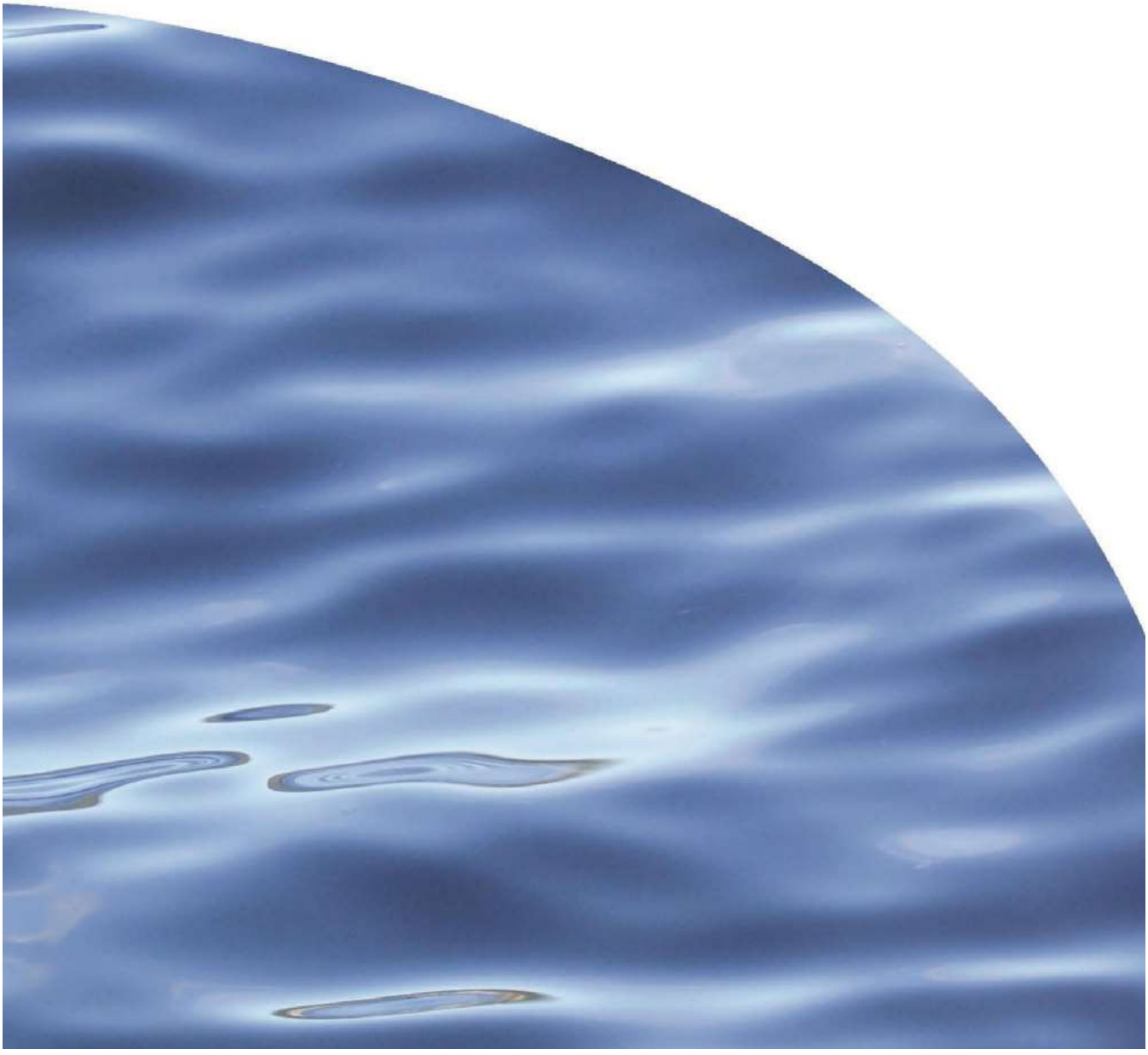

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IMPACTS OF VEHICLE ACCESS AT DELAWARE (WAKAPUAKA) INLET

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EXECUTIVE SUMMARY

In 1999 the opening of Maori Pa Road extended public vehicle access to the eastern side of Delaware Inlet (north of Nelson), which is the estuary of the Wakapuaka River. Since then an increasing number of vehicles have been using an informal boat launching site located on the south-eastern margin near the end of the public section of Maori Pa Road. Launching boats from this site involves vehicles driving across the tidal flats at low- and mid-tide levels. This has caused offence to the local hapū and Māori owners of the adjacent Wakapuaka 1B block. Nelson City Council commissioned Cawthron Institute to assess the ecological impact of vehicle traffic on the estuary and the nature and extent of boat usage, views of local residents and local hapū. The pros and cons of different options are then presented.

In 1998, the Māori Land Court recognised Te Huria Matenga Wakapuaka Trust as having freehold title to the Wakapuaka estuary in Delaware Bay. The Crown challenged the decision and in 2011 the Supreme Court subsequently dismissed the Trust's bid for freehold title. The debate contributed to the introduction of the Foreshore and Seabed Act in 2004, whereby the Crown vested ownership of the foreshore and seabed in the public domain.

Intertidal habitats associated with estuaries provide a link between terrestrial and marine environments. Delaware Inlet is recognised as being ecologically significant within the Nelson Biodiversity Strategy. It retains areas of intact vegetation sequences from coastal forest through to salt meadows, salt marsh and intertidal flats containing seagrass (rimurēhia, eelgrass) beds. The tidal flats contain invertebrate communities including shellfish beds. The inlet is also an important breeding, feeding and nursery area for a variety of fish and bird species and was listed as a site of national importance primarily as habitat for banded rail and banded dotterel. In a wider context, the productive habitats of Delaware Inlet contribute to the food web of Tasman Bay.

Physical disturbance of estuaries by vehicles can damage benthic habitats, including the plants and animals inhabiting them. In New Zealand, the area of seagrass beds has declined substantially for various reasons and damage caused by off-road vehicles can be a contributing factor in localised areas.

Assessment of ecological impacts

Cawthron assessed ecological impact of vehicle traffic on Delaware Inlet in two ways. First, we used aerial photography to assess changes in dominant habitat types relative to previous surveys and to identify any visible vehicle tracks. Second, using a fine-scale survey we looked for differences in sediment composition and benthic plants and animals (living both on and within the sediment) between areas with high and low vehicle usage.

Vehicle usage zones within the study area covered a relatively small amount (2%) of Delaware Inlet, yet accounted for around 16% of total seagrass beds within the estuary. Visible vehicle tracks showed direct physical damage to seagrass and other habitats in areas

subject to both higher and lower amounts of vehicle usage. Nearly complete loss of seagrass patches higher up the shore suggested a possible impact of vehicles, although this could not be confirmed due to differences in mapping methodologies from study to study and the possibility of changes due to natural fluctuation or other human stressors not related to vehicle impacts. Likewise, there was some evidence to suggest an historical (pre-1988) impact of vehicle usage on seagrass distribution, although the effects of this could not be separated from the influence of the type and distribution of sediments.

From the fine-scale survey, there were several apparent ecological impacts of higher vehicle usage in the midshore area, including sediment compaction, differences in infaunal community composition, lower infaunal abundance and reduced cockle numbers. The number of epifauna taxa was also lower within the higher vehicle usage zone in the low shore, although it was not possible to separate the effects of this from the influence of different sediment types.

In summary, there is good evidence of direct disturbance of seagrass from visible vehicle tracks and some evidence, albeit inconclusive, that vehicle traffic has caused a reduction in the extent of seagrass beds over time. Similarly, we consider that higher vehicle usage is likely causing some impacts in the midshore on sediment structure and the associated benthic animal community, including cockles.

Boat user counts and survey

We conducted site observations and a brief survey of boat users at Delaware Inlet and Cable Bay. Time lapse photography was used to count boat users at both sites.

Delaware Inlet was the more popular boat launching site, with an average of 68 boat launchings or retrievals per week, compared to 27 at Cable Bay. The highest weekly usage was 107 launchings or retrievals at Delaware Inlet during the week of 27 January 2017, with 49 at Cable Bay the same week. The highest vehicle count on a single day occurred on Saturday 25 February, with 33 vehicles at Delaware Inlet and 11 at Cable Bay. Numbers of vehicles dropped in early March.

Of the 62 people surveyed at Delaware Inlet, the most popular reasons for launching at that location were the proximity to good fishing grounds, safety, and qualities of the location such as quietness, wildness and beauty. Other reasons were the closeness to home, ease of access, suitability for small boats, suitability for children and families, fuel efficiency and no boat launching charge. Several respondents recounted incidents when they got into trouble while attempting to launch or retrieve boats at Cable Bay. Boats and vehicles needing to be towed at Cable Bay also create safety issues for others on the beach.

We asked 42 boat users about local ecology. Of these, 24% (n = 10) expressed some knowledge about the ecology of the estuary. Seven people said that they stayed on the main vehicle tracks on the estuary, avoided areas where seagrass is present, or only launched and retrieved their boats at high tide (to avoid driving over the estuary).

Views of local residents and iwi

Ten local residents were interviewed for their views on vehicle usage and boat launching at Delaware Inlet and Cable Bay. Many residents were attracted to the area for its natural beauty and recreational opportunities. Many of the interviewees (averaging 30 years residence) noted a substantial increase in vehicle numbers at Delaware Inlet since 1999 when Maori Pa Road became open to the public. Cable Bay had also increased in popularity in recent years. No residents were in favour of building a concrete ramp for boat launching at Cable Bay, citing factors that make this a challenging and sometimes dangerous place to launch a boat.

The majority of local residents interviewed supported the following: a marked route across the estuary to contain vehicles launching boats at low and mid-tides to a singular path, better signage with information and maps, and restrictions on boat size and a speed limit for motor boats. One couple opposed all vehicle and horse riding access at Delaware Inlet. Many residents mentioned the nuisance of 'joyriders' at Delaware Inlet who drive away from the main paths taken by vehicles launching boats, thereby extending areas of impact and sometimes getting their vehicles stuck. Harsher penalties were suggested by some local residents for those who deliberately deviate from a marked route, although others also noted the difficulty of enforcing regulations given the relative isolation of Delaware Inlet and Cable Bay.

A trustee of Ngāti Tama ki Te Waipounamu Trust and Te Huria Matenga Wakapuaka Trust was interviewed to gain the perspectives of the local hapū who are mana whenua of Wakapuaka. Unimpeded public access does not respect the concerns or mana of Ngāti Tama ki Te Waipounamu. Those concerns include the impacts of vehicles on the estuarine habitat and species, as well as increased access to other parts of Delaware Inlet, causing erosion of sand dunes on Delaware spit and disturbing wāhi tapu (sacred sites) such as urupa, where some interference with koiwi (bones) has occurred.

The Huria Matenga Trust remains opposed to all vehicle access on the tidal flats at Delaware. The Trust prefers that the recognised boat launching site at Cable Bay be improved. They consider that a marked route across the estuary for vehicles launching boats at Delaware Inlet would be ineffective at protecting the estuary. Instead, they suggested a single wooden ramp to protect the ecology of the estuary by ensuring that vehicles did not directly drive across and therefore impact the shellfish beds and eelgrass. Citing examples such as boat ramps at Kaiteriteri and Port Nelson, it was suggested that the cost of such a ramp could be met through user charges.

The table below summarises a preliminary assessment of options. A more complete assessment would require further consideration and consultation with affected parties.

Preliminary assessment of options for boat access at Delaware Inlet and Cable Bay:

Option	Pros	Cons
Status quo	Low financial cost (at least in short term).	Damage to estuary and associated cultural values continues. Rules in NCC coastal plan not being enforced.
No vehicle access to estuary at Delaware Inlet	No more damage to estuary (assuming rules can be enforced). Potential for seagrass rehabilitation.	Enforcement could be difficult and/or expensive. Safety issues for boat users. Renewed animosity between residents, iwi and boat users.
Marked route(s) at Delaware Inlet to limited number of launching points	Reduced damage to estuary. Potential for seagrass rehabilitation outside marked route(s).	Not all vehicles will stay on route. Some ongoing impacts to estuary. Some maintenance required of route markings.
Long wooden ramp at Delaware Inlet	Minimises on-going damage.	Cost. Structure would have visual effects, some shading effects and changes to currents. Possible damage to estuary during construction phase. On-going maintenance required.
Improve facilities at Delaware Inlet; booking system for parking	Improves experience for users.	Cost. Likely to lead to increased use and therefore more damage to estuary.
Improved signage about values of Delaware Inlet	Greater environmental awareness by boat users. With other measures, could help to reduce impact on estuary.	Unlikely to deter 'joyriders' and some boat users from inappropriate behaviour. Damage to estuary and associated values continues.
Restrictions on users of Delaware Inlet e.g. boat/trailer size limits; no jet skis	Reduced ecological and other impacts (depending on restrictions).	May be difficult to enforce.
Install concrete ramp and improve other facilities at Cable Bay	Safer and better experience for users. Some users diverted from Delaware Inlet so reduced impact to estuary.	Increased congestion at Cable Bay, conflict with beach users. Construction cost, with on-going maintenance. Cable Bay still not safe in some conditions.
Regular monitoring of Delaware Inlet	Provides basis for periodic review of approach.	Cost. May not provide definitive conclusions.

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1. INTRODUCTION

An increasing number of vehicles are using an informal boat launching site at Delaware Inlet that involves vehicles driving across exposed tidal flats (Figure 1). This has caused offence to the local hapū and Māori owners of the adjacent Wakapuaka 1B block who, among other things, are concerned about the damage caused by vehicles to the ecology of the estuary. The Nelson City Council (NCC) is reviewing its coastal plan and would like to include new provisions governing access to the estuary that address and, as far as feasible, reconcile the interests and concerns of local Māori, residents and boat users. The Council commissioned Cawthron Institute (Cawthron) to assess the nature and extent of boat usage, views of boat users, local residents and Māori, and the ecological impact of vehicle traffic on the estuary.

The report aims to:

- Assess the impact of vehicles on the ecology of the estuary, especially on seagrass and animals living in the sediments
- Gain an accurate account of vehicle numbers launching or retrieving boats at Delaware Inlet and Cable Bay
- Gather the perspectives of boat users at Delaware Inlet and Cable Bay
- Interview local residents and local hapū for their views on vehicle access at Delaware Inlet
- Provide a preliminary assessment of options for boat access at Delaware Inlet and Cable Bay.

Figure 1. Delaware Inlet (pictured at low tide) and Cable Bay. Inset shows location relative to Nelson and Tasman Bay. The red area shows where vehicles can access the estuary.

1.1. Ecological significance of Delaware Inlet

Delaware Inlet is an estuary situated on the eastern side of Tasman Bay at the mouth of the Wakapuaka River and approximately 19 km northeast of the city of Nelson. It is separated from adjacent Cable Bay only by a narrow tombolo, which connects Pepin Island to the mainland. The inlet opens to Delaware Bay through a narrow channel and is classified as a permanently open tidal lagoon (Hume et al. 2016). It is approximately 353 hectares in size and mostly consists of estuarine tidal flats that are exposed at low tide (Figure 1).

Estuaries are dominated by intertidal habitats, which provide a link between terrestrial and marine environments. They perform important ecosystem functions, including primary and secondary production[1], nutrient retention/processing and sediment trapping. These roles contribute to the capacity of estuaries to function as a land/sea buffer that is critical to the sustainability of coastal ecosystems. Estuarine habitats are often of high ecological value and contain resources of significant cultural, recreational and commercial benefit.

[1] Primary productivity is the synthesis of new organic material from inorganic molecules e.g, photosynthesis. Secondary production is the generation of biomass of consumers, representing the quantity of new tissue created through the use of assimilated food.

Estuaries play an important role in the community for a diverse range of reasons. They are valued by Māori for the rich resources they provide in the form of timber for building materials, rongoa (medicine), harakeke (flax) for weaving, and many sources of kai (food).[2] Māori often established settlements near estuaries, and they were also a preferred site for European settlement—typically after clearing the 'swampy, forested, impenetrable edge of the land' (Park 1995, p. 236). Today estuaries are valued for various recreational opportunities and appreciated for their ecological values and the aesthetic enjoyment they bring to many.

Specifically, Delaware Inlet is ecologically important and recognised as being significant within the Nelson Biodiversity Strategy (Lawless & Holman 2006). It retains areas of intact vegetation sequences from coastal forest through to salt meadows, salt marsh and intertidal flats containing seagrass (rimurēhia, eelgrass) beds. The tidal flats contain invertebrate communities including shellfish beds (Gillespie et al. 2011b). Delaware Inlet is also an important breeding, feeding and nursery area for a variety of fish and bird species and is a site of national importance, primarily as habitat for banded rails (*Gallirallus philippensis assimilis*) and banded dotterels (*Charadrius bicinctus bicinctus*) (Davidson et al. 1994). Variable oystercatchers (*Haematopus unicolor*) have been reported breeding along its coastal margins (Boffa Miskell 2015).

In a wider context, the productive habitats of Delaware Inlet contribute to the food web of Tasman Bay by absorbing, processing and exporting terrestrial and marine nutrients (Gillespie 2008). The stretch of coastline potentially influenced by estuary outwelling is recognised to have special importance with regard to the Horoirangi Marine Reserve to the west and the Taiāpure Management Area and recreational fishing grounds in Delaware Bay.

1.2. Brief history of Ngāti Tama at Delaware Bay

Ngāti Tama hapū are mana whenua of Wakapuaka (Delaware Bay), and are part of Ngāti Tama ki Te Waipounamu who whakapapa to northern tribes from the Taranaki region through the common ancestor, Tama Ariki, the tupuna who was a tohunga and navigator on the Tokomaru waka. Ngāti Tama descend from Paremata—the stepson and nephew of Te Pūoho ki te Rangi who, in 1828/29, led a taua of approximately fourteen waka into Wakapuaka (*Interview* 8 March 2017). Ngāti Tama gained land in Te Tau Ihu (the top of the South Island) as a result of conquest, maintained by settlement and through occupation and use of '…lands, forests, waterways, foreshores, sea and other resources' (Walters Williams & Co 2003, p.8).

[2] https://www.niwa.co.nz/education-and-training/schools/students/estuaries

Starting in the 1830s, European settlement and Crown interventions affected Ngāti Tama occupation and use of their lands. In their Treaty of Waitangi claim (Wai 723), Ngāti Tama outlined grievances resulting from Crown breaches of the Treaty of Waitangi 1840, including: surveys by the New Zealand Company in the late 1830s, the Wairau Incident in June 1843, the Spain Commission from 1844–1845, and surveys of Ngāti Tama boundaries in 1845 and 1847. These interventions resulted in land loss that had a detrimental impact on Ngāti Tama's economic and social stability:

> The Crown's failure to properly monitor the [New Zealand] Company's surveys of the boundary between the Company lands and Wakapuaka lands provoked the skirmishes which arose in 1845 and 1847, and the consequent losses of land suffered by Ngati Tama (Walters Williams & Co 2003, p.14).

In 1998, the Māori Land Court recognised Te Huria Matenga Wakapuaka Trust as having freehold title to the Wakapuaka estuary at Delaware Bay; however, '…the Registrar-General of Lands in 1999 refused to register the court's orders' (Ansley 2003). The Crown took the Māori Land Court decision to the Court of Appeal that overturned the ruling, and in 2011 the Supreme Court subsequently dismissed the Trust's bid to reverse that decision (NZPA 2011). The Trust's claim to title of the Delaware Inlet sparked national debate, which contributed to the introduction of the Foreshore and Seabed Act in 2004, whereby the Crown vested ownership of the foreshore and seabed to the public domain.

1.3. History of vehicle access to Delaware Bay

During our work for this report, we heard anecdotal accounts of boat users driving on the estuary to launch boats at Delaware Inlet since at least the 1970s. Prior to 1999, Maori Pa Road was private and vehicle access to Wakapuaka east of the Wakapuaka River was restricted by a locked gate. Fishers who wished to launch boats required approval from the local property owners (Nelson City Council 2004, p. 1).[3]

In 1997, a subdivision in the area was approved by NCC, and by July 1999 the bridge over the Wakapuaka River had been improved to Council requirements. Following that, Maori Pa Road was redesignated a public road; the private road continues just beyond where vehicles are currently gaining access onto the estuary.

[3] In the Court of Appeal case (2008) Judge Isaac summarised evidence provided by Jack Harvey (b.1928): "…iron gates were erected and kept locked 'even after the Matenga Estate sold the property. If you wanted to go fishing …you had to get permission from Mrs Martin (Huria Matenga [Trust]) … That was for fishing in the inlet and out in the Bay too … In my Dad's time, he and his brothers used to do a lot of fishing down there and they always went and got permission…'" The Trustee of Te Huria Matenga Whakapuaka Trust interviewed for this study confirmed: "There was only a handful of vehicles that utilised the estuary for the purpose of launching boats prior to the public road" (pers. comm. 10 May 2017).

The accessibility of Maori Pa Road to the public from 1999 enabled more recreational fishers to use the informal boat launching site. Boat users gain entry to the channel at low- and mid-tide by driving over the tidal flats at Delaware Inlet. Ecological damage to the estuary has long been a concern to local hapū, and Te Huria Matenga Wakapuaka Trust requested NCC take action to prevent further damage by vehicles.

In 1999, the Council installed a padlocked chain barrier (authorised vehicles could still gain access subject to approval by the Trust), and in 2001 this was replaced with a gate that was then padlocked in 2003. The gate was vandalised by unknown parties and subsequently removed by the Council. There is currently no physical restriction to vehicles driving onto the tidal flats at Delaware Inlet; this remains an unresolved and hence contentious issue.

According to chapter 13 of the Nelson Resource Management Plan, driving of vehicles on, and disturbance of the foreshore or seabed by vehicles, is permitted only in specific circumstances, e.g. the launching or retrieving of recreational or commercial vessels at launching ramps, which are mapped in the plan. The Cable Bay launching point is mapped in the plan, whereas the access point to Delaware Inlet at Māori Pa Road is not. In practice, councils exercise discretion regarding enforcement of conditions on permitted activity rules.

2. LITERATURE REVIEW OF VEHICLE IMPACTS ON ESTUARIES

Estuaries are subject to a range of anthropogenic stressors that can compromise their health (Ellis et al. 2015). Physical disturbance of intertidal areas caused by vehicle traffic can damage benthic habitats, including the plants and animals inhabiting them. While a comprehensive literature review was outside the scope of this study, we briefly summarise the literature regarding the effects of vehicles driving over tidal flats. Due to limited research on vehicle impacts within estuaries, the review was supplemented with information based on sandy beaches as well as similar human activities, e.g. human trampling, horse riding, boating activities and scientific experiments. Salt marsh habitats were not included in this review because there are no such habitats in the study area affected by vehicles.

2.1. Impacts on seagrass

Seagrasses are flowering marine plants that inhabit both intertidal and subtidal coastal zones. *Zostera muelleri* (eelgrass) is indigenous and the only species of seagrass present in New Zealand. Seagrass meadows are an important natural attribute of many New Zealand estuaries and have high ecological value (Matheson et al. 2009; van Houte-Howes et al. 2004). Although their photosynthetic contribution can be relatively modest by global standards (McRoy & McMillan 1977; Gillespie & MacKenzie 1981), they provide a stable physical habitat and a localised food source to support a diverse community of animals including a variety of fish species (e.g. snapper, garfish, trevally) (Matheson et al. 2009). Seagrass beds are important foraging areas for certain shorebirds (e.g. variable oystercatcher). They also help filter nutrients and trap sediments, thereby maintaining water quality (Turner & Schwarz 2006), and they release oxygen from their leaves and roots, which is beneficial for other biota and stimulates nutrient cycling (Matheson et al. 2009).

Seagrass meadows are disappearing at a rapid rate worldwide (McCloskey & Unsworth 2015). In New Zealand, seagrasses have also experienced serious decline (Matheson et al. 2009) and examples of relatively recent declines include losses of up to 90% of subtidal seagrass beds in Tauranga Harbour (Turner & Schwarz 2006) and 58% in intertidal seagrass beds in Nelson Haven (Gillespie et al. 2011a). New Zealand seagrasses face a variety of pressures and are particularly vulnerable to anthropogenic disturbance associated with catchment land use activities, e.g. sediment and nutrient runoff, and coastal development (Turner & Schwarz 2006). Physical disturbance, including damage from off-road vehicles, is an example of a threat that can damage seagrasses in localised areas (Turner & Schwarz 2006; McCrone 2001).

Overseas, physical disturbance of seagrass has led to fragmentation, a reduction in shoot density, canopy height and coverage, and potential permanent loss of habitat (e.g. McCloskey & Unsworth 2015). In New Zealand, a study in Otago Harbour found that off-road vehicles, as well as human trampling and horse riding, had caused physical disturbance to estuarine habitats. Four-wheeled motorbikes and horse riding dislodged seagrass rhizomes and roots leading to the formation of large bare patches, while heavy trampling resulted in the decline of above-ground biomass of seagrass and the beginning of trench formation (Miller 1998; McCrone 2001).

Within the Nelson/Marlborough region, vehicle traffic in the Ngakuta estuary and Delaware Inlet has resulted in visible track marks within seagrass meadows (Gillespie et al. 2011b, Gillespie et al. 2012b). Although localised, it was noted that damaged seagrass could take several seasons to regenerate, with any repeated disturbances potentially resulting in long-term damage or mortality. Experimental seagrass patch disturbance on intertidal reef platforms in Kaikoura resulted in increased erosion followed by decreased growth rates and, in many small patches, mortality (Ramage & Schiel 1999). Seagrass damage and decline overseas has in some instances been attributed to boating-specific activities such as moving propellers, dragging boat hulls across the ground and anchor damage (e.g. Bell et al. 2002; Martin et al. 2008; McCloskey & Unsworth 2015).

Physical disturbance can also indirectly cause harm to seagrass populations by making them more susceptible to diseases such as *Labyrinthula*, a wasting disease that has caused a decline in the health of seagrasses both overseas and in New Zealand (Turner & Schwarz 2006).

Efforts to facilitate the restoration of declining seagrass meadows at previously productive sites have generally met with limited success worldwide (Campbell 2002; Orth et al. 2006; van Katwijk et al. 2016). However, Matheson et al. (2017) reported survival and growth of transplanted *Zostera muelleri* and successful rehabilitation of declining seagrass meadows in Whangarei Harbour. Their work suggests the potential for restoring *Z. muelleri* meadows by transplanting from donor sites to sites formerly occupied. Re-instatement of suitable growing conditions at former sites was thought to be critical for transplantation success and donor sites recovered within nine months. These findings suggest that, in conjunction with proactive management of vehicle disturbance, there may be potential for promoting recovery of seagrass meadows that have been previously displaced.

2.2. Impacts on organisms inhabiting the sediments

Benthic invertebrate populations living in tidal flats, including those occupied by seagrass, can comprise a wide range of epifaunal[4] and infaunal[5] species. Changes in these communities can have negative consequences for the delivery of ecosystem services such as the provision of food for higher trophic levels. Benthic invertebrates are vulnerable to physical disturbance caused by vehicles. In Cape Cod (USA), tidal flat areas driven over by off-road vehicles were considered severely impacted, with effects including reduced survival of marine infauna such as worms, amphipods, clams and other molluscs (Leatherman & Godfrey 1979). This potentially limited the ability of shorebirds and fish to feed in these areas and decreased the amount of organic material supplied to the food web as detritus. Off-road vehicles also modified the environment by compacting the substrate to a pavement-like surface, interfering with normal exchange of seawater within the sediments and creating anaerobic conditions in the substrate. This prevented clams from extending their siphons to the surface to obtain food and water at high tide, which eventually results in death of filter-feeding organisms.

Besides modifying population dynamics and distributions of mudflat animals, compaction of the sediment can also alter the exchange of nutrients and oxygen between the sediment and the overlying water, and change the sediment accumulation rate (Contessa & Bird 2004; Rossi et al. 2007). Fifty passes by vehicles per day over 20 days on the Cape Cod tidal flats resulted in severe degradation, with recovery predicted to occur only after complete vehicle exclusion (Leatherman & Godfrey 1979).

Most research regarding vehicle impacts on intertidal benthic invertebrates has been conducted on exposed sandy beaches. An Australian study found that even low-level vehicle traffic could negatively impact the beach environment, with compaction, rutting and displacement of the sand matrix observed over a large area (Davies et al. 2016). This resulted in significant decreases in diversity and density of invertebrate species, and measurable shifts in community structure. Other overseas studies on sandy beaches have shown that vehicle impacts can cause mortality of surf clams, as well as sub-lethal effects such as impairment of burrowing performance and a reduction in body mass (e.g. Schlacher et al. 2008; Sheppard et al. 2009).

In New Zealand, vehicle damage was considered a cause of reduced adult toheroa (*Paphies ventricosa*) abundance along a considerable portion of the Oreti Beach in Southland (Moller et al. 2014). Around 4% of juvenile toheroa were found to be damaged (and presumed killed) each time they were driven over by a car or motorbike, and 2% killed per pass by utilities and four-wheel drive vehicles. Vehicle traffic also caused substantial mortality to toheroa on Ninety Mile Beach (Northland)

[4] Small invertebrates living on top of benthic (seafloor) habitats.
[5] Small invertebrates living within the sediment.

with mortalities (crushed shells) of up to 14% in small toheroa following heavy vehicle traffic associated with a recreational fishing contest (Hooker & Redfearn 1998; Morrison & Parkinson 2001).

Benthic invertebrates living within seagrass beds can also be affected by physical disturbance, either directly or indirectly as a response to damaged seagrass habitat. In overseas studies, it has been reported that intense human trampling in seagrass beds has reduced seagrass biomass as well as abundances of some invertebrate taxa (e.g. Eckrich & Holmquist 2000), and reduction in seagrass cover resulted in changing community composition and reduced species richness (McCloskey & Unsworth 2015).

2.3. Impacts on other animals

Vehicle impacts can extend to non-benthic animals, such as birds, although a review of this is not provided here. Impacts on birds can be direct, e.g. damage to nests and disruption of foraging, as well as indirect, e.g. reduction in a food source or quality of important habitats. In the Nelson region, vehicle traffic has been identified as having potentially adverse impacts on shorebirds (Schuckard & Melville 2013).

3. METHODS

3.1. Study area

The study area for the ecological assessment was located on the eastern side of Delaware Inlet and adjacent to a car pull-off area on Maori Pa Road from which vehicles drive onto the tidal flats (Figure 2). This area was chosen to encompass the intertidal habitat being driven over by vehicles, largely for the purpose of launching and retrieving boats. Immediate surrounding areas subject to low (or possibly no) vehicle usage were also included for the purpose of providing survey comparisons.

The boat users' survey and fixed camera-based vehicle count focused on the study area for Delaware Inlet as well as the northern end of the tombolo at Cable Bay, both marked in red in Figure 2. Local residents of Maori Pa Road and Cable Bay were included in the study interviews.

Figure 2. Delaware Inlet in relation to Tasman Bay, showing the ecological study area and Cable Bay boat launching location (marked with red square).

3.2. Habitat mapping

Field-verified habitat mapping of the intertidal environment was based on standardised methodologies outlined in the Estuarine Monitoring Protocol (EMP) (Robertson et al. 2002). These methods were modified slightly to provide more accurate measures (i.e. quantitative assessment of percentage cover categories) of vegetation to better suit the purposes of the current work.

3.2.1. Aerial photographs

High resolution aerial photographs of the study area in Delaware Inlet were collected from an altitude of 60 m by a Phantom 4 Pro drone at low tide on 28 January 2017. The photos were aligned to produce an orthophoto[6] that comprised 53659 x 46894 pixels with a pixel distance of 17 mm.

3.2.2. Ground-truthing and map digitisation

A field team of Cawthron scientists ground-truthed[7] the aerial orthophoto by identifying and delineating dominant habitats at low tide on 2 February 2017 (Figure 3). They recorded boundaries between areas of dominant substrata or biota using GPS tracking and sketched these directly onto a laminated orthophoto. They classified these areas by describing the dominant substrate types and the presence and density of vegetation. The classification system was based on an interpretation of the Atkinson (1985) system and the estuarine national classification system developed by Ward and Lambie (1999). Habitat types were coded according to EMP protocols and, where applicable, habitat names were aligned with previous mapping efforts that also followed EMP protocols within Delaware Inlet (e.g. Gillespie et al. 2011b). Substrate classification was based on surface layers only and did not consider underlying substrate (e.g. gravel fields covered by sand would be classed as sand). To reduce subjectivity, soft sediment substrates were categorised as either soft (grouping together 'soft' and 'very soft') or firm.

[6] An orthophoto is an aerial photograph geometrically corrected ('orthorectified') such that the scale is uniform i.e. the photo has the same lack of distortion as a map.

[7] Ground-truthing involves verifying features identified from an aerial photo (or potentially from a model) by physically inspecting a sample of these features on the ground and, where errors are found, correcting the identification.

Figure 3. Cawthron scientists conducting ground-truthing for habitat mapping in the Delaware Inlet.

To standardise percentage cover estimates of vegetation, field team members took photoquadrats of seagrass and macroalgae randomly throughout the study area using a quadrat (of size 0.25 m^2) divided into 36 equally sized squares. They determined percentage cover by counting the number of gridline intersections (49 in total) that overlapped vegetation and converted the result to a percentage as in Robertson et al. (2002). The results were then classified into four categories of cover: < 20%, 20%–50%, 50%–90% and > 90%.

The field team conducted ground-truthing for the majority of the study site (red area in Figure 2), but restricted this to habitats exposed by the low tide on the boat launching (south-eastern) side of the main channel. A Cawthron scientist used GIS software (ArcMap 10.4) to digitise habitat features with reference to the ground-truthing exercise explained above.

Vehicle usage

Where possible, vehicle tracks noted in the orthophoto were verified by the field team during ground-truthing. The longevity of visible vehicle tracks within the study area was unknown and likely dependent on substrate type and the amount of interstitial water present. Therefore, in order to determine the boundaries of zones subject to differing amounts of vehicle usage, the abundance of vehicle tracks, a photographic time series from a fixed camera, and field observations of boats being launched were all used in our calculations. We digitised the vehicle tracks and created polygons to represent five vehicle usage zones, for use in planning the positioning of fine-scale survey sites (Figure 4). Vehicle usage intensity zones (considered for the intertidal region only) were categorised using an inverse scale, with Zone 1 having the highest vehicle usage and Zone 5 the lowest (Figure 4). The zones represent usage intensity

at the time of the 2017 survey (6 January to 9 March); it is possible that usage intensity was distributed differently in previous years.

3.2.3. Comparisons of key habitats

We made comparisons of the area cover of key habitats within the vehicle usage zones between regions subject to differing vehicle usage intensities during the current study, as well as against historical habitat maps by Franko (1988) and Gillespie et al. (2011b). The lack of pre-vehicle usage baseline data, or a suitable control area within the current study, generally limited the interpretation of vehicle impacts in this report to the effects of higher versus lower vehicle usage rather than a comparison with no vehicle usage at all.

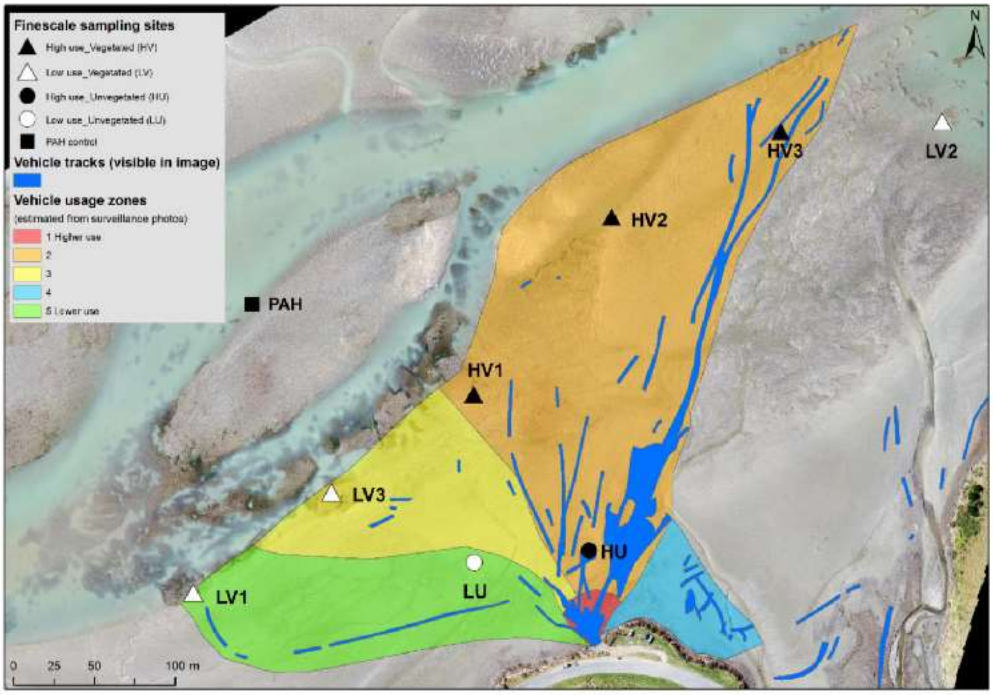

Figure 4. Map of the study area in Delaware Inlet showing the position of the eight main fine-scale sites, as well as the polycyclic aromatic hydrocarbon (PAH) control site, and vehicle usage zones. Visible vehicle tracks are also displayed.

3.3. Fine-scale survey

The field team conducted a fine-scale ecological survey at low tide on 15 March 2017, and sampled eight main sites overall (Figure 4). They positioned six sites in

vegetation (seagrass beds) within the low shore (Table 1). Three of these sites were in the high vehicle usage zone positioned at or nearby visible vehicle tracks (see sites labelled HV), and three in the low vehicle usage zone (see sites labelled LV). They positioned the other two sites on unvegetated substrate within the midshore, with one subject to high and the other to low vehicle usage (sites labelled HU and LU respectively). Note that, for the purposes of the fine-scale survey, we simplified vehicle usage into two zones overall: high (Zones 1 and 2), and low (Zones 3–5 plus the one site located outside the zones).

Table 1. Description of the fine-scale survey design in regards to the locations of the eight main study sites.

Usage	Vegetated (V) (low shore)	Unvegetated (U) (midshore)
High vehicle usage (H) (located in Zones 1 and 2)	3 sites (n = 3 for each site) (HV)	1 site (n = 3) (HU)
Low vehicle usage (L) (located in Zones 3 and 5, as well as outside the vehicle usage zones)	3 sites (n = 3 for each site) (LV)	1 site (n = 3) (LU)

Infauna (including cockles), epibiota[8] and sediment samples were collected and/or surveyed within a 2 metre radius from the centre of the main fine-scale sites. One sediment core profile was also collected at each site.

3.3.1. Sediment

Core profiles

At each site, we collected one sediment core in a random location using a 62 mm diameter Perspex tube pushed to a depth of at least 150 mm into the substrate. We described sediment colour, stratification and texture profiles and paid particular attention to any black (anoxic) regions. Where anoxic regions occurred, we recorded the average depth of the lighter-coloured surface layer as the depth of the apparent redox discontinuity layer (RDL)—defined as the transitional zone between aerobic (oxygenated) sediments and anaerobic (deoxygenated) sediments. Any noticeable sulphide odours were also noted as further indication of anoxic conditions.

Grain size and polycyclic aromatic hydrocarbons (PAH)[9]

At each site, we scraped three sediment samples for grain size analysis from the top 20 mm of sediment and mixed them together to form one composite sample. We also

[8] Plants and animals living on top of benthic habitats.
[9] PAHs are a group of complex hydrocarbons that are common constituents of fuels and lubricating oils but most typically arise from the incomplete combustion of organic materials.

collected sediment samples for PAH analysis from all sites within the high vehicle usage zone and mixed these into one composite sample. Another sample was also collected at a control site outside the vehicle usage zones (site PAH in Figure 4). All sediment samples were chilled prior to analysis by Hill Laboratories (see Appendix 1 for analysis methods).

3.3.2. Epibiota and infauna

At each site, we identified and recorded all visible epifauna within three 0.06 m^2 quadrats (0.25 x 0.25 m). We also estimated the percentage cover of macroalgae and seagrass within each quadrat using the method described in Section 3.2.2. The percentage of seagrass with darkened (as opposed to green) leaves was estimated by eye in each quadrat and categorised as either uncommon, common or abundant.

At each site, we collected three infauna samples by inserting a 130 mm diameter core to a depth of 100 mm into the sediment. Core contents were gently washed through a 0.5 mm mesh sieve and the residual preserved with 95% ethanol (plus 5% glyoxal) in seawater. Cawthron taxonomists later stained infauna with rose-bengal solution before identifying and counting them. In addition, they sieved cockles (tuangi, *Austrovenus stutchburyi*) in each core through 10 mm and 15 mm sieves and recorded the numbers for the three resulting size categories (< 10 mm, 10–15 mm, > 15 mm).

We evaluated infauna and epifauna data according to the number of taxa and the number of individuals (abundance). Differences in benthic animal (epifauna and infauna) communities between replicate samples from sites within the low shore, and between replicate samples from sites within the midshore, were visualised using non-metric multidimensional scaling (nMDS; Clarke & Warwick 1994) based on Bray Curtis similarities (Bray & Curtis 1957). This method places sites in a two-, three- or multi-dimensional space according to their similarities and differences. If a two-dimensional (2-D) representation explains a sufficient proportion of the sample differences observed, these can be assessed spatially on a 2-D plot, where the distance between sample points corresponds to the degree of difference observed between benthic communities. A stress statistic provides a measure of how well the plot represents the differences between all of the individual samples. We applied a square-root transformation to the data during this process to reduce the influence of the most dominant species (Clarke & Warwick 1994). For infauna communities, the major taxa contributing to the similarities and differences were identified using the similarity percentages routine (SIMPER) based on Bray-Curtis similarity and 70% contribution cut-off (Clarke & Warwick 1994). We conducted all multivariate analyses using the software package PRIMER v.7 (Clarke & Gorley 2006).

Cockles

At each of the two midshore sites (HU and LU), the field team collected all cockles within three 0.25 m^2 quadrats to a depth of approximately 6 cm using a rake and small trowel. They sieved the cockles through two mesh sizes (10 mm and 15 mm) and recorded the numbers for each of the three resulting size classes (< 10 mm, 10-15 mm and > 15 mm). Infauna cores from each of the eight sites (see Section 4.3.1) also provided cockle abundance information, although the core size was likely too small to provide reliable data regarding the abundances of larger-sized cockles.

Statistical analyses

We compared average values for epibiota, infauna and cockle data between the high and low vehicle usage zones at both vegetated (low shore) and unvegetated (midshore) tidal heights. Note that a difference was considered unlikely if there was an overlap between average values ± 2 x standard error (SE) (Altman & Bland 2005).

3.4. Boat users' survey

Cawthron employed a graduate student from the University of Canterbury from 9 January until 3 March 2017 on a Cawthron summer scholarship. The student observed boat users and their use of vehicles to launch or retrieve boats at Delaware Inlet and Cable Bay (Figure 5). Over a period of five weeks, the student was present in the field for 13 days at either or both locations to observe characteristics of vehicle use and, where possible, to conduct a short survey with those boat users.[10]

Figure 5. Cawthron scholarship student stationed on site to observe boat users at Delaware Inlet.

[10] The student was in the field on the following days: 11, 13, 14, 17, 20, 21, 24, 28, 29 and 30 January, and 5 February. She was also in the field two days earlier in January, but no boat users were available to be surveyed.

An observation chart (Appendix 2) was developed to record attributes of each boat user, including the type of boat (e.g. motorised launch or kayak), number of occupants, length of boat, horsepower of the boat, and size class of the vehicle (e.g. 2WD, 4WD or van). We also recorded locational information, such as the date and time, tidal information taken from the Land Information New Zealand (LINZ) website (rounded to the nearest five minute interval), weather conditions and wind speed (e.g. calm, light, moderate or strong).[11]

In addition to the observation chart, the student approached boat users with an invitation to take part in a short boat user survey in the form of a qualitative questionnaire (Appendix 3). The questionnaire sought to gather further information on user demographic, type of use, behaviour and attitudes with respect to the estuary. The questionnaire was voluntary and took between 1-5 minutes. Most boat users happily accepted the invitation.

The boat user survey was originally planned for four intervals of five consecutive days, but after the student spent two days in the field with no survey results the field days were decided on a day-by-day basis. Factors affecting that decision were weather forecast, incoming/outgoing tides, wind speed and swell. Websites (including metservice.com, swellmap.co.nz and marineweather.co.nz) were consulted in order to ascertain sea conditions that would be favourable for boat users at either Delaware Inlet or Cable Bay on any given day.

The busiest periods for launching and retrieving boats were later in the week and during weekends, early in the morning (around 0600 h), and two hours either side of high tide. It was evident that Delaware Inlet was more popular for launching and retrieving boats than Cable Bay which was quieter, especially during weekdays. As a result, the student adjusted her days in the field to spend the majority of survey days at Delaware Inlet, on weekdays and weekends between the hours of 6 am and 12 noon, and on statutory holidays (which included Nelson Anniversary and Waitangi Day). The student continued to check at Cable Bay and to interview boat users she encountered. If there was a boat trailer there, she left a note informing the boat user of the study and providing contact details should they wish to participate.

3.5. Photographic capture

In order to obtain an accurate record of vehicle usage, cameras were mounted overlooking the boat launching sites at Cable Bay and Delaware Inlet. Both cameras were located on private property with permission of landowners.

[11] Note that the tides in Delaware Inlet are delayed by about one hour from those predicted for Nelson due to flow restriction at the narrow tidal entrance. We accounted for this adjustment in our records.

The cameras recorded a continuous series of images, at five minute intervals, for nine weeks from Friday 6 January until Thursday 9 March 2017. No individual vehicle or boat registration details were identifiable from the photographic images recorded.

Images were downloaded every two weeks and boat user numbers were recorded at both sites. In addition, the student plotted the launching and retrieval locations on an image taken from the fixed camera. By cross-checking the time with tide information, we were able to identify which locations were popular at high, mid and low tides. This information was used in the ecological habitat mapping work to identify zones subject to different intensities of vehicle usage within the Delaware Inlet study area.

3.6. Interviews with local residents

Nelson City Council notified a number of local residents who live along Maori Pa Road and Cable Bay Road of this study by letter in December 2016. Cawthron researchers contacted these residents in January 2017, inviting them to be interviewed as part of the study. A Social Research Ethics Application was completed to ensure appropriate interview protocol and conduct. Each interviewee was given an Information Sheet and a Consent Form. Written consent was obtained from each interviewee before proceeding with the interview and audio recording. A Cawthron social scientist attended the first three interviews along with the student, and thereafter the student completed the remaining five interviews alone. A total of eight interviews involving ten participants were completed between 31 January and 15 February 2017.[12] Interviews took place at the resident's home with each lasting no more than an hour.

The interviews established the residents' history in the area; explored the issues concerning protection of the estuary and environs (values, changes observed, feelings, and their personal recreational use); and enquired about ways of finding a solution acceptable to local iwi, local residents and recreational boat users (Appendix 4).

3.7. Interview with Trustee of Ngāti Tama ki Te Waipounamu Trust and Te Huria Matenga Wakapuaka Trust

A Cawthron social scientist interviewed a Trustee of Ngāti Tama ki Te Waipounamu Trust and Chair (also a trustee) of Te Huria Matenga Wakapuaka Trust at the Cawthron Institute on 8 March 2017. The interview took one hour and followed a similar social research ethics protocol to that outlined above (for interviews with local residents), obtaining the interviewee's oral permission before recording the interview. The interview was subsequently transcribed, checked by the interviewer, and then

[12] Three interviews with four residents took place on 31 January 2017; other interviews were conducted on 5, 7 and 9 February, and two more interviews (with three residents) were completed on 15 February 2017.

sent to the interviewee for verification and/or amendment on 31 March 2017. See Appendix 5 for the interview questions.

4. RESULTS AND DISCUSSION

4.1. Habitat mapping results

Unvegetated habitats within the study area were covered largely by firm shell/sand and gravel field (Figure 6). The area covered by all vehicle zones was 6.6 ha out of a total of 353 ha comprising Delaware Inlet. Zones 1 and 2 covered 3.9 ha and all other zones combined covered 2.7 ha. Visible vehicle tracks imprinted into the substrate covered approximately 58% of Zone 1, 11% of Zone 2, and 1.5–8.8% for all other zones (Figure 4, Figure 7).

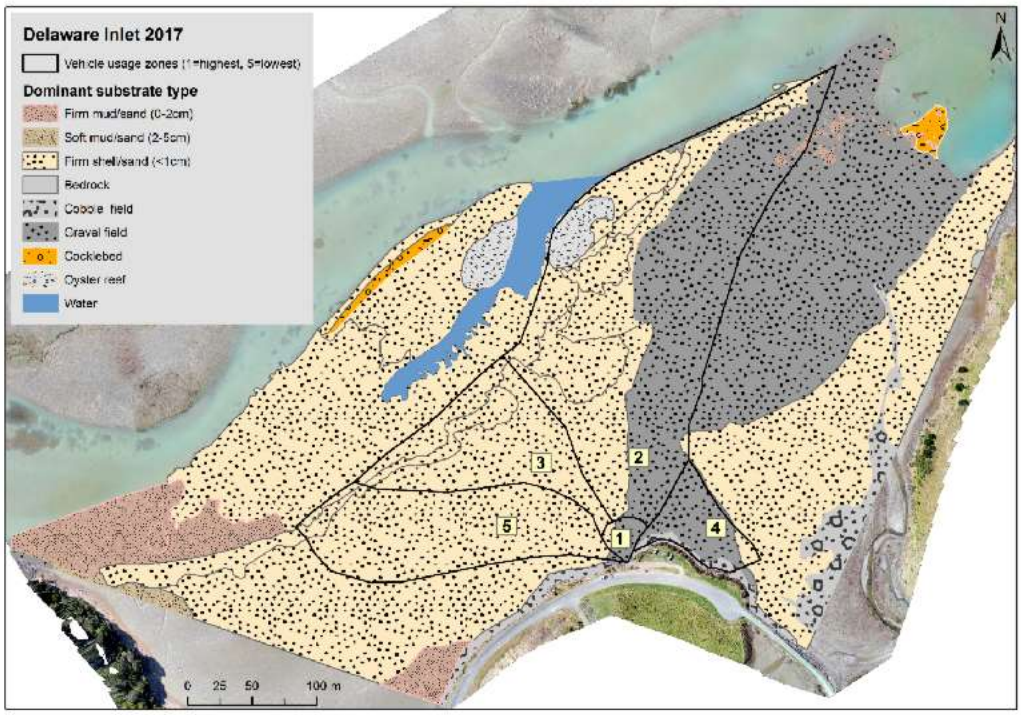

Figure 6. Unvegetated substrate, showing only dominant categories, within the Delaware Inlet study area in 2017. Boundaries for vehicle usage zones (1–5) are also shown and numbered.

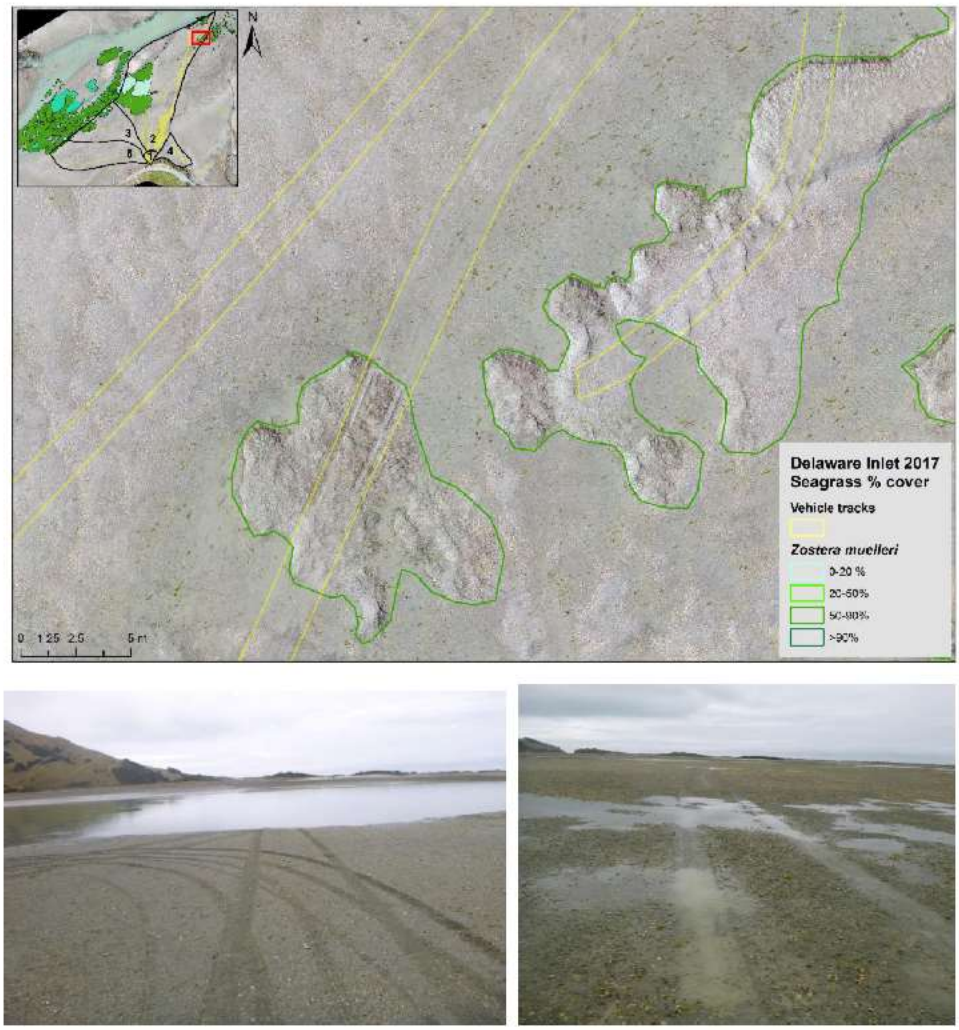

Figure 7. Vehicle tracks on benthic substrates in the vehicle usage zones in Delaware Inlet. Aerial image taken by drone with accompanying map (top), and photo taken by camera (bottom), during habitat mapping 2017.

4.1.1. Vegetation

Seagrass

In 2017, seagrass was present in all vehicle usage zones that extended down to the low shore, and covered 1.0 ha of the 6.6 ha total area of all zones (Figure 8, Figure 9). Vehicle tracks were visible in seagrass habitat (Figure 7). An area generally devoid of seagrass ran along the eastern side of Zone 2 and was subject to relatively high vehicle usage (Figure 8). This area coincided with a dominant surface substrate of gravel field (Figure 6), as well as being an area with a relatively high number of visible

vehicle tracks (Figure 4). Comparisons of seagrass cover in the study area in 2017 (Figure 8) against historical maps from 1988 (Figure 10) and 2009 (Figure 11) indicated that seagrass beds have contracted and expanded over time, both within and beyond the area subject to vehicle traffic. In Zone 2, there was nearly complete loss of some seagrass patches higher up on the shore (approximately 0.14 ha in combined size in 2009); these were present historically (1988 and 2009) but barely observed in 2017.

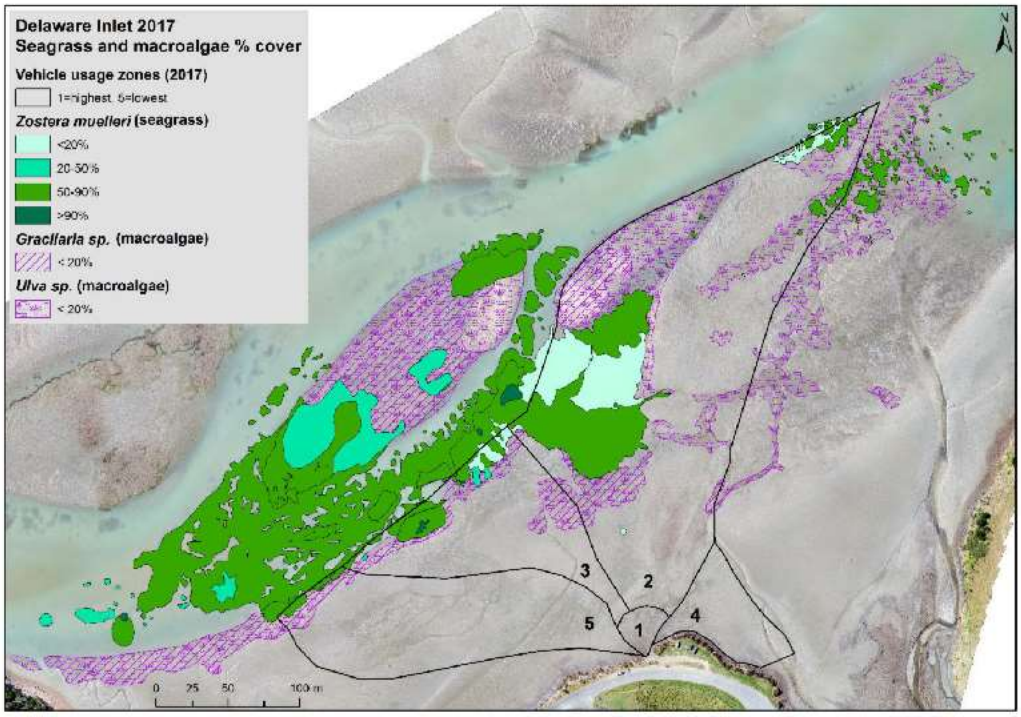

Figure 8. Percent cover of vegetation (seagrass beds and macroalgae) within the Delaware Inlet study area in 2017. Boundaries for vehicle usage zones (1–5) are also shown and numbered.

Figure 9. Seagrass beds within the Delaware Inlet study area, 2017.

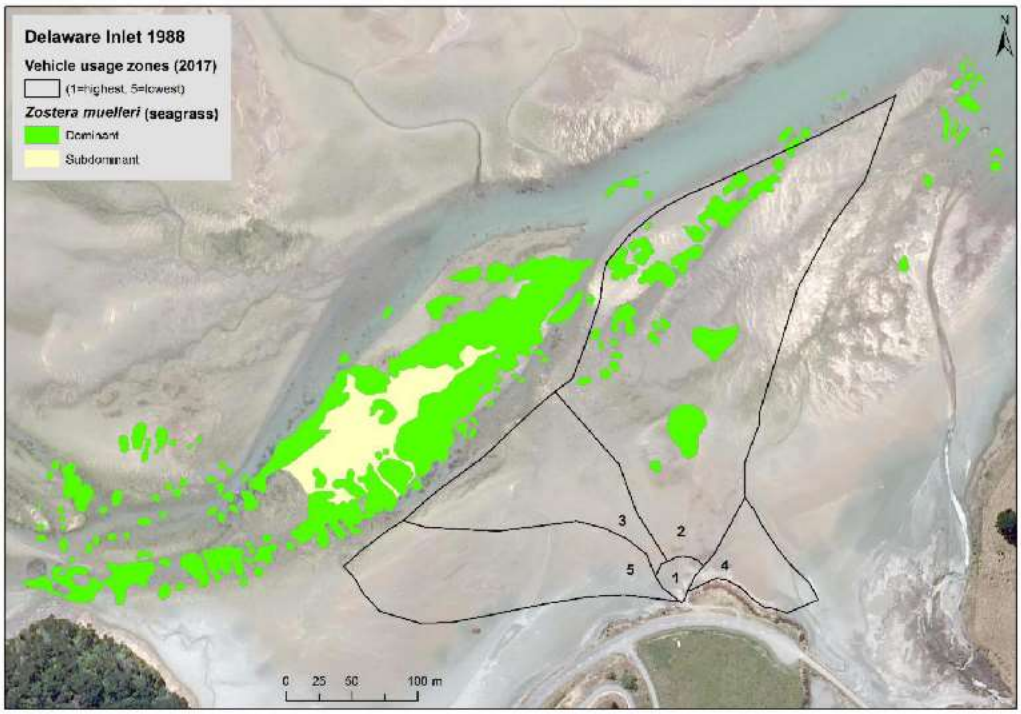

Figure 10. Location of seagrass beds in 1988 (Franko 1988) within the study area. Boundaries for vehicle usage zones (1–5) in 2017 are also shown and numbered.

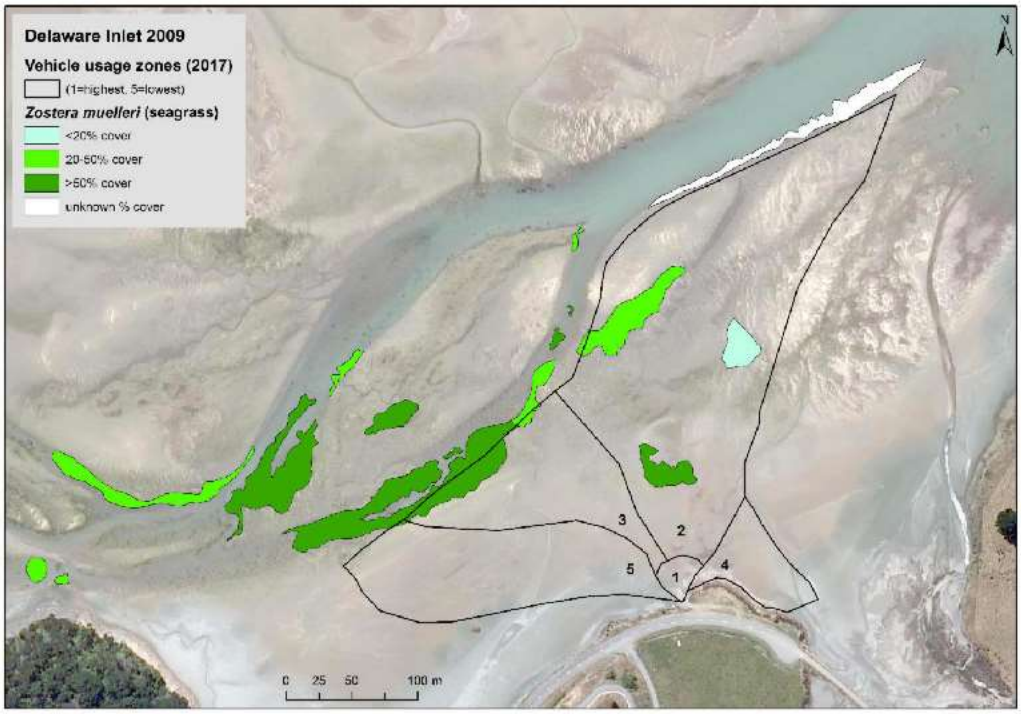

Figure 11. Location of seagrass beds in 2009 (Gillespie et al. 2011b) within the current study area. Boundaries for vehicle usage zones (1–5) in 2017 are also shown.

Macroalgae

Sea lettuce (*Ulva* sp.) and agar weed (*Gracilaria* sp.) were present at low levels (< 20% cover) throughout the study area (Figure 8). An area containing limited macroalgal cover (and also lacking seagrass) was located along the eastern side of Zone 2 (relatively high vehicle usage).

4.2. Changes to area of key habitats

4.2.1. Seagrass

Seagrass within the vehicle usage zones represented 16% of the total 6.3 ha of seagrass recorded in Delaware Inlet in 2009 (Gillespie et al. 2011b)[13], even though the vehicle usage zones represent only approximately 2% of the Inlet. The 2009 coverage of 6.3 ha was a reduction from 8.9 ha of seagrass estimated in 1988[14], although the 1988 estimate included some subtidal seagrass beds that may have

[13] These figures for seagrass coverage include areas where seagrass was subdominant vegetation as well as areas where it was dominant.
[14] Map created in 1988 based on photographs taken in 1983.

accounted for some of the temporal difference (Gillespie et al. 2011b). In addition, historical contraction and expansion of seagrass beds was apparent outside the vehicle usage areas. This may have been due to natural variation (e.g. Turner & Schwarz 2006), deterioration caused by non-vehicle related pressures (e.g. sedimentation) (Gillespie et al. 2011b), and/or differences in mapping methodologies.

In this study, we found visible vehicle tracks on benthic habitats (including seagrass) in all vehicle usage zones, as well as outside the zones in some areas, indicating direct physical damage caused by vehicles. Vehicle tracks were also observed in Delaware Inlet in seagrass beds by Gillespie et al. (2011b).

The eastern side of Zone 2 had a relatively high number of vehicle tracks and hence may be an area of possible impact on seagrass. In this zone, small seagrass patches higher up the shore were present in 1988 and 2009 but barely observed in 2017, an impact that may have been caused by vehicle usage. However, the possible impact of vehicle usage on seagrass in this area was confounded by the presence of gravel field substrate (and possibly other unmeasured environmental variables, such as elevation). Little is known about the sediment grain size preference of seagrass (*Z. muelleri*) in New Zealand. In Australia, *Zostera capricorni* has generally been found to grow better in coarse (i.e. sandier in comparison to fine) sediments, although coarse sediments are generally lower in nutrients and organic matter and, in some cases, increasing grain size was considered likely to be detrimental to the distribution and biomass of seagrasses (Turner & Schwarz 2006). In Europe, *Zostera* species can grow on gravel as well as mud (Greve & Binzer 2004).

There did not appear to be much (if any) seagrass growing on gravel field substrate outside of the vehicle usage zones in Delaware Inlet, suggesting that seagrass may be favouring other substrates. The prevalence of visible vehicle tracks indicates that gravel field was possibly targeted for driving over. However, the eastern side of Zone 2 also lacked seagrass in 1988 and 2009. Therefore, if vehicle damage was the cause, it would be historical (i.e. prior to 1988) and related to low vehical usage during that time.

Further results regarding seagrass cover are found in the results of the fine-scale survey (see Section 5.3.2).

4.2.2. Macroalgae

Due to the ephemeral nature of macroalgae, it was not considered appropriate to use changes in their distribution to assess vehicle impacts.

4.3. Fine-scale survey

4.3.1. Sediment results

Core profiles

There were no obvious differences in sediment core profiles between the high and low vehicle usage zones at the vegetated (low shore) sites. Cores were generally light brown/medium grey to a depth of 3–8 cm with darker sediment (sometimes becoming black with a slight hydrogen sulphide odour) below this depth (Figure 12). The unvegetated (midshore), sediment cores were light brown in the top 2–3 cm with light grey sediment (from cores taken in the low vehicle usage zone), and medium grey (high vehicle usage) below this depth, with no distinct hydrogen sulphide odour. At the high vehicle usage/unvegetated (midshore) site, sediment was highly compacted, preventing the collection of a core profile below 4 cm.

Figure 12. Photograph of a sediment core from one of the vegetated (low shore) sites.

Grain size and PAH

Sediments at all sites comprised largely sand (from 73–98%) (Table 2). Levels of mud and gravel/shell within sediments were generally low, although some variability existed with a relatively high amount of mud at site LV1, and relatively high amounts of gravel/shell at sites LV2 and LU. No PAHs were detected from sites within the high vehicle usage zone or the control site outside the vehicle usage zones.

Table 2. Sediment grain size composition at the vegetated low shore (V) and the unvegetated midshore (U) survey sites subject to low (L) and high (H) vehicle usage in Delaware Inlet.

Sediment (g/100g dry wt)	HV1	HV2	HV3	LV1	LV2	LV3	HU	LU
Gravel/shell (Fraction ≥ 2 mm)	1.7	0.6	0.2	0.5	17.9	0.05	9.2	19.5
Sand (Fraction < 2 mm, ≥ 63 µm)	93	97.8	94.6	84.2	77.4	96.1	84.3	73.4
Mud (Fraction < 63 µm)	5.3	1.7	5.2	15.3	4.7	3.8	6.5	7.2

4.3.2. Epibiota results

Epifauna

Overall, 18 epifauna taxa were recorded from the fine-scale survey with the small gastropod *Micrelenchus tenebrosus* (topshell) and cockle the most abundant (Appendix 6 and Figure 13). Average epifauna abundance was similar between sites within the vegetated (low shore) and between sites within the unvegetated (midshore) (Table 3). In the low shore sites, the number of taxa was slightly higher within the low, compared to the high, vehicle usage zone, with the opposite pattern occurring in the midshore, although very low numbers were present. Multivariate analysis (non-metric MDS) indicated considerable overlap (i.e. no obvious differences) in composition between epifauna communities from the low and high vehicle usage zones from both vegetated and unvegetated sites (Figure 14).

Figure 13. Examples of quadrats from vegetated and unvegetated sites within which epibiota were quantified.

Table 3. Average (± 1 SE) total number of taxa and total abundance for epifauna communities in the high vehicle usage (H) and low vehicle usage (L) zones at vegetated low shore (V) (shaded cells, n = 9) and unvegetated midshore (U) (unshaded cells, n = 3) site groupings in Delaware Inlet.

	Number of Taxa (Taxa per core)	Abundance (individuals per core)
LV	6.1 ± 0.6	48.9 ± 7.0
HV	3.8 ± 0.5	36.4 ± 13.6
LU	2.3 ± 0.3	5.3 ± 1.5
HU	4.0 ± 0	6.0 ± 0.6

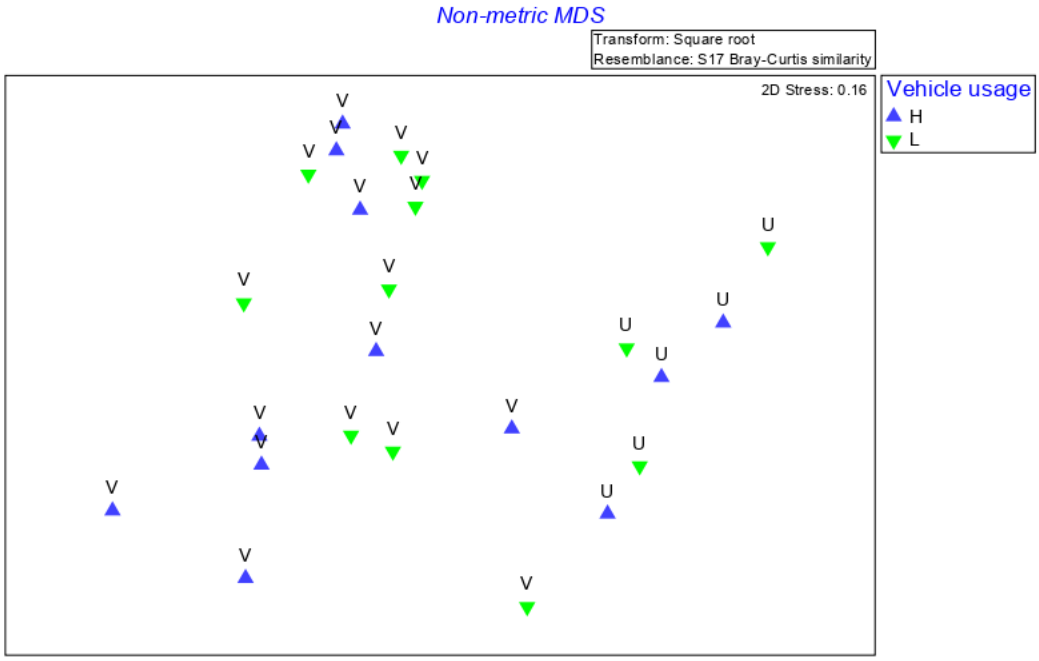

Figure 14. Non-metric MDS showing epifauna communities from vegetated low shore (V), and unvegetated midshore (U) sites subject to high (H – blue triangle) and low (L – green triangle) vehicle usage in Delaware Inlet.

Seagrass

The average percentage cover of seagrass (low shore), at 81% (± 2.4 SE), was consistently high and much less variable within the low vehicle usage zone, in comparison to the high vehicle usage zone (58% ± 10.0 SE) (Appendix 6). However, this difference falls short of the statistical test for significance, so we are not able to conclude that there is a statistically significant difference in the cover of seagrass between these two zones. Seagrass with darkened leaves (Figure 15), indicative of partial decay likely due to *Labyrinthula* (wasting disease) infection, was common at all

vegetated (low shore) sites, with no obvious differences observed between sites at the high and low vehicle usage zones.

Figure 15. Seagrass from Delaware Inlet showing patches of darkened leaves likely caused by *Labyrinthula* infection.

Macroalgae

Sea lettuce, the most commonly occurring macroalga recorded during the fine-scale survey, was observed only within the high vehicle usage zone, although in very low abundance (< 1% cover in any one quadrat) (Appendix 6). Two other macroalgal taxa (agar weed and an unidentified red alga) were also present although extremely low in abundance.

4.3.3. Infauna results

Overall, 67 infauna taxa were recorded from the fine-scale survey, with polychaetes (e.g. capitellids and *Prionospio aucklandica*) and bivalves (e.g. *Arthritica bifurca* and cockle) the most abundant (Appendix 7). At the vegetated (low shore) sites, the average number of taxa and total abundance were similar between the high and low vehicle usage zones with relatively high variation in total abundance (Table 4). At the unvegetated (midshore) sites, the average number of taxa was similar although total abundance was somewhat higher within the low vehicle usage zone.

At the vegetated (low shore) sites, multivariate analyses (MDS and SIMPER) indicated relatively high variability in community structure within the high and low vehicle usage zones but there was evidence for some slight compositional differences

between the zones. As shown by the spatial separation in Figure 16, at the unvegetated (midshore) sites, community differences were apparent. The SIMPER analysis revealed that *Prionospio* sp. (a polychaete) contributed proportionally more to the infauna community in the high vehicle usage zone whereas *Arthritica bifurca* (a bivalve) contributed proportionately more in the low vehicle usage zone (further details in Appendix 8).

Table 4. Average (± 1 SE) number of taxa and total abundance for infauna communities in the high vehicle usage (H) and low vehicle usage (L) zones at unvegetated midshore (U, n = 3, unshaded cells) and vegetated low shore (V, n = 9, shaded cells) site groupings in Delaware Inlet.

	Number of Taxa (Taxa per core)	Abundance (individuals per core)
LV	20.6 ± 1.9	170.0 ± 29.2
HV	18.8 ± 1.4	135.1 ± 33.6
LU	10.0 ± 1.5	77.0 ± 10.0
HU	6.0 ± 1.0	31.3 ± 5.7

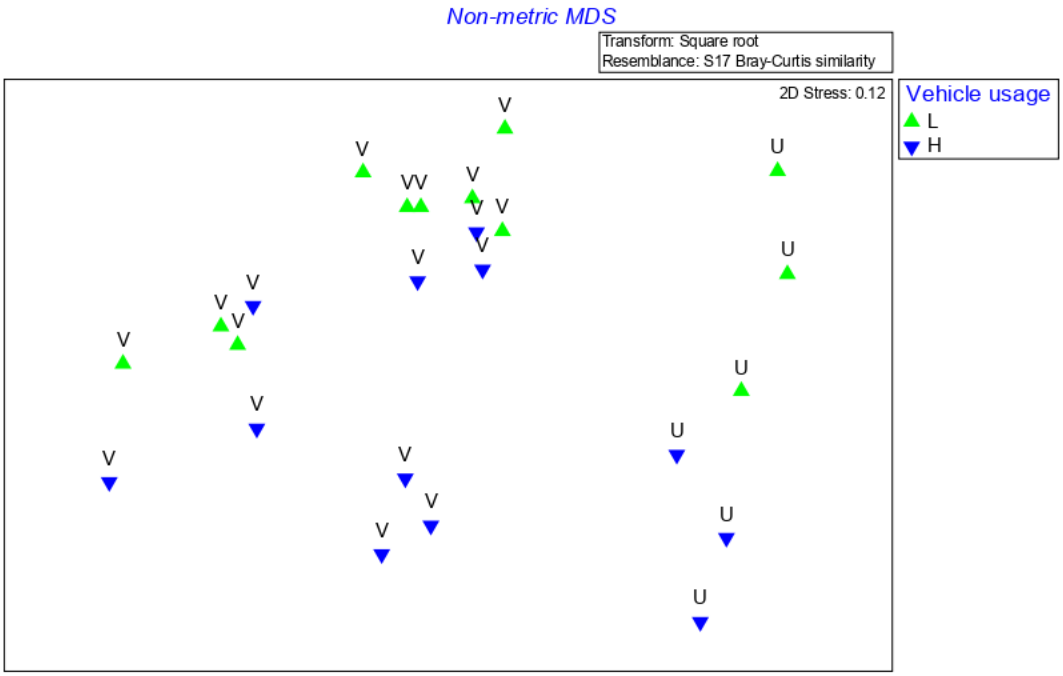

Figure 16. Non-metric MDS showing infauna communities from vegetated low shore (V), and unvegetated midshore (U) sites subject to high (H – blue triangle) and low (L – green triangle) vehicle usage in Delaware Inlet.

Cockles

At the two unvegetated (midshore) sites, the average abundance of cockles (Figure 17) from the quadrats was higher in all three size classes within the low, compared to the high, vehicle usage zone (Table 5). Cockle numbers in cores from the two unvegetated sites were similar within the < 10 mm and 10–15 mm size classes, and slightly higher within the size > 15 mm size class, at the low versus high vehicle usage zones. At the vegetated sites (cores only), average abundance cockle in all size classes was comparable between the high and low vehicle usage zones.

Figure 17. Image of a cockle (tuangi, *Austrovenus stutchburyi*).

Table 5. Average abundance (± 1 SE) of cockles in three size classes collected from 0.25 m^2 quadrats (shaded cells, n = 3) and from (130 mm diameter and 10 mm deep) cores (unshaded cells, n = 3 for U and n = 9 for V) in the high vehicle usage (H) and low vehicle usage (L) unvegetated midshore (U) and vegetated low shore (V) sites in Delaware Inlet.

Cockle size classes	< 10 mm	10-15 mm	>15 mm
HU Quadrat	18.0 ± 6.1	24.3 ± 10.7	2.7 ± 1.2
LU Quadrat	95.7 ± 28.8	333.7 ± 32.0	108.0 ± 13.6
HU Core	16.0 ± 3.5	4.0 ± 2.1	2.0 ± 1.5
LU Core	31.7 ± 16.3	17.7 ± 4.8	10.0 ± 4.4
HV Core	10.7 ± 3.4	6.1 ± 1.6	0.4 ± 0.2
LV Core	11.2 ± 3.5	3.1 ± 0.9	0.6 ± 0.8

4.4. Fine-scale survey discussion

In New Zealand estuaries, the taxonomic composition of sediment-dwelling invertebrate communities is well known to be strongly influenced by sediment grain size, although most studies look specifically at the amount of mud present (e.g. Hewitt et al. 2005; Ellis et al. 2015; Robertson et al. 2015). In this study, the possible impacts

of higher vehicle usage were at least partially confounded by varying sediment grain size composition (as well as possibly other unmeasured variables unrelated to vehicle usage). This was particularly so at the unvegetated (midshore) sites, where the proportion of sand was approximately 10% higher (and consequently gravel/shell 10% lower) at the high versus low vehicle usage site.

That said, differences in sediment composition and structure may also be related to vehicle traffic. For example, sediment compaction within the unvegetated (midshore) high vehicle usage site was likely to have been caused by higher vehicle usage, as visible vehicle tracks were present at this site and it was positioned relatively close to Zone 1, the highest usage zone, where nearly all vehicles entered the estuary.

The vegetated (low shore) sites within the low vehicle usage zone also exhibited variation in sediment composition. At the vegetated (low shore) sites within the high vehicle usage zone, grain size was relatively uniform, although the surface substrate[15] indicated by habitat mapping, i.e. the gravel field at site HV3, may be influencing epibiota.

Lack of statistical significance of results may have also partially been due to the relatively small number of replicates in the current survey.

4.4.1. Biotic communities

For epifauna, the overall evidence does not support a conclusion of an impact of higher vehicle usage on average abundance or number of taxa. At the vegetated (low shore) sites, the number of epifauna taxa was slightly lower at sites subject to higher vehicle usage, but this was confounded by varying sediment grain size. In the midshore sites, there were slightly higher numbers of epifauna taxa and abundance at the high vehicle usage site, but only a relatively small number of taxa were recorded overall.

For infauna, abundance was somewhat lower at the unvegetated (midshore) site subject to higher vehicle usage, and community differences between the low and high vehicle usage sites were apparent. It is possible that this was caused by differing sediment grain size composition, although sediment compaction, and other vehicle impacts such as mortality through direct crushing, at the midshore high vehicle usage site were considered likely to be having a detrimental effect on the composition of infauna communities.

There was little statistical evidence of an impact of higher vehicle usage on the total number of infauna taxa at any of the sites, or on infauna abundance at the vegetated (low shore) sites. At these sites, there was evidence of only slight community

[15] Note that the surface substrate recorded during habitat mapping does not necessarily reflect the grain size of the underlying sediment measured from sediment samples collected during the fine-scale survey.

differences between high and low vehicle usage zones, insufficient to attribute to possible vehicle impacts.

4.4.2. Cockles

In New Zealand, cockles are present within soft mud to fine sand although they tend to be more abundant in sediments with larger grain size (Michael 2008). Bivalve shellfish can also be affected by sediment compaction, which can prevent them from extending their siphons to the surface to obtain food (Leatherman & Godfrey 1979). Vehicles also can cause direct mortality through crushing and sub-lethal effects.

In our study, at the two unvegetated (midshore) sites subject to higher vehicle usage, cockle abundance from the quadrats was lower than at the sites with lower vehicle usage. This could be explained by the preference of cockles for coarser grain size, although the presence of sediment compaction at the site suggests that vehicle traffic is likely to be contributing to reduced cockle numbers at this site.

Unlike the results from the quadrats, average cockle numbers measured from the smaller cores were not consistently higher at the lower vehicle usage sites. However, it is possible that the cores were not large enough in size to accurately reflect cockle abundances, particularly for larger sized cockles.

4.4.3. Seagrass

There was inconclusive evidence of an impact of higher vehicle usage on the percentage cover of seagrass. The higher usage zone had greater variation in seagrass cover and lower average cover (although the difference in average cover was not statistically significant). It is possible that surface substrate type was the cause of the greater variation (see Section 5.2) although there was no evidence for this in the site-level data. With regard to the disease detected in the Delaware Inlet seagrass, *Labyrinthula*-infected seagrass beds have also been detected in other estuaries within the Nelson region (e.g. Gillespie et al. 2012a, 2012b).

Due to the ephemeral nature and low abundance of sea lettuce (a macroalga), it was not considered appropriate to use it as an indicator of possible impacts of higher vehicle usage.

The lack of detection of any PAHs within the sediment suggested that vehicles were not causing this type of contamination within the study sites.

4.5. Field observations of boat usage

The Cawthron summer scholarship student was stationed in the field at Delaware Inlet and Cable Bay boat launching locations for a total of 13 days over a five week period in January and February 2017. She kept a logbook for noting factors that influenced vehicle use at both locations. Noteworthy observations included the following:

- There appeared to be a large number of natural factors [i.e. weather, tide, swell] that determined the volume of use. For example, over the Nelson Anniversary and Waitangi Day holiday weekends, besides the fact that they were public holidays, the weather was good and there was little wind or swell. With high tide around midday, people could launch in the morning and come back around lunch time before the afternoon sea breeze picked up. In contrast, ordinary weekends were a lot quieter when the weather was bad, or if there was a moderate amount of wind (this would usually mean it was even windier out in the bay).
- The majority of boat users launched early in the morning between 5:00 am and 7:00 am, regardless of the tide. However, families and more casual users who were more concerned with safety and convenience would launch at mid tide and return on high tide.
- Very few boat users were encountered on weekdays between Monday and Thursday, or on bad weather days.
- A couple of times people were observed launching in a second location, roughly 100 metres east of the main launching point, where a stream emerges into the estuary (Zone 4). When queried, they explained that they didn't want to wait for other boat users trying to launch or load at the main launch location. However, this was a rare occurrence.
- Apart from the abovementioned, everyone we observed used similar routes. Although tracks were visible in other parts of the estuary, these were not necessarily from vehicles launching a boat and no one was observed launching in unusual locations or driving to random places in the estuary.
- A couple of people were observed gathering cockles, etc. They did not drive out onto the estuary; however, in the photographs several vehicles can be seen parked on the estuary without boats. It is unclear what activities they were engaged in: gathering food, walking or something else.
- One man drove down to the estuary especially to speak to our student, as he had heard from others that we were interviewing and wanted to have his say. He wanted the estuary to remain open to boat users. Three people also telephoned the student in response to the notice she left on their windscreen at Cable Bay.
- One man sailed his small sailboat in the estuary almost every day. He had a hand trolley that he used to launch his boat without driving on the estuary.

- Cable Bay attracted very few boat users on weekdays. However, on weekends when the weather was good, the beach was very crowded and the car park very full, mostly with swimmers and other beach users.
- At Cable Bay, one boat user was observed getting into trouble while attempting to load his boat. The waves crashed over into the boat and nearly submerged it. He needed help from several other adults to get his boat on the trailer. When interviewed afterwards, he said he would never launch or load at Cable Bay again.
- At Cable Bay, another boat user was observed getting his vehicle stuck in the sand while trying to pull his boat back up the beach. Another boat user towed him to stable ground.

4.6. Boat users' survey

The Cawthron student spoke to 77 boat users out of a total of 115 observed sightings of users while on site at Delaware Inlet (n = 69) and Cable Bay (n = 8). Some users were encountered more than once. Most boat users were frequent users of the area; in fact, only seven at Delaware Inlet were launching boats for the first time at that location. Similarly, only two at Cable Bay were new to that boat launching site. At Delaware Inlet, several of the first-time users expressed uncertainty about where and how to launch their boats safely.

Asked how many times they had used the site over the past month, the average response at Delaware Inlet was 2.4 times (with a maximum of 16 times, by a resident of Cable Bay), whereas at Cable Bay (from a much smaller sample) only one user surveyed had used the site more than once in the past month.

Of the 77 users surveyed, 17 were from the local area (Cable Bay, Delaware Bay or Hira), 49 came from Nelson or Richmond, 10 from elsewhere in Tasman District and one from Havelock.

The majority of users launched small motorised boats (typically for the purpose of recreational fishing) at either Delaware Inlet or Cable Bay, thereby driving over the estuary or beach (respectively) to launch and retrieve their boat. However, not all users used vehicles to launch their crafts: kayakers and paddle boarders typically walked their vessels across the estuary.

Boat users were asked about the following (see Appendix 3 for the actual questions):

- reasons for use
- preference for Delaware Inlet or Cable Bay
- boat users' knowledge of the ecology, history and cultural heritage of the area
- suggestions for improving boat access in the area.

4.6.1. Reasons for using Delaware Inlet and Cable Bay

The student asked respondents: "Why do you use this particular location?" Of the 62 people interviewed at Delaware Inlet (excluding first-time users who did not offer responses as they considered they didn't have enough prior knowledge of the area), the most popular reasons for launching at that location were the proximity to good fishing grounds, safety, proximity to home, and qualities of the location such as quietness, wildness and beauty. Other reasons were the ease of access, suitability for small boats, suitability for children and families, fuel efficiency and no boat launching charge. Of the six people interviewed at Cable Bay (excluding the two first-time users), the most popular reason for launching boats at that location was proximity to good fishing grounds (or in one case, diving). The other reasons mentioned were safety, closeness to home, suitability for children and families, and the beautiful location.

Note that numbers in Table 6 indicate the number of times that reasons were mentioned by boat users (not the number of users per se).

Table 6. Count of boat users' reasons for launching at Delaware Inlet and Cable Bay.

Reasons for use	Delaware Inlet	Cable Bay
Proximity to good fishing grounds	30	5
Safety	20	1
Quiet, wild and beautiful location	16	1
Close to home, accessible	16	1
Ease of access	12	0
Suitable for small boats	11	0
Suitable for children and families	3	1
Fuel efficient	3	0
Free (no boat launching charge)	2	0

4.6.2. Preference for Delaware Inlet or Cable Bay

The student asked boat users whether they used other boat launching locations in the area and to assess what made those boat launching locations better or worse. Specifically, she asked why they chose to launch at Delaware Inlet over Cable Bay, or vice versa.

Of the 62 people interviewed at Delaware Inlet (excluding first time users for the same reason explained above), 25 (37%) claimed that Cable Bay was "too dangerous" or that Delaware Inlet was "safer". Several respondents recounted incidents when they had been "caught out" or got into trouble while attempting to launch or retrieve boats

at Cable Bay. Likewise, 13 respondents (19%) said that Cable Bay is "too difficult" to launch/retrieve boats or that Delaware is "much easier".

Figure 18. Soft sand at the Cable Bay boat launching area.

One user explained that he had been using Delaware Inlet for 20 years, but prior to that he had used Cable Bay and had "got stuck" three times. A local resident confirmed that boat users at Cable Bay frequently get their vehicles stuck in the soft sand (Figure 18) when trying to tow their boat back up the beach. This was also observed during fieldwork for this study (see Section 4.8.4). Towing boats and/or vehicles with high tension ropes creates safety issues for boat users, swimmers and other beach users—who include families with small children. Another boat user recounted an experience at Cable Bay wherein his friend was attempting to load his boat onto the trailer, but the incoming swell was too strong and his boat smashed through the car's back window.

One boat user at Cable Bay explained that he never launches his boat at Delaware Inlet, but instead always brings a tow rope to Cable Bay in case he or others encounter difficulties. Another boat user, after getting his vehicle stuck in the sand, stated that he will never launch there again because it was too difficult to retrieve the

boat and load it onto the trailer due to waves and the sandy slope. He intended to use Delaware Inlet next time he wished to launch in the vicinity.

4.6.3. Knowledge of local ecology, history and cultural heritage

Questions in the qualitative questionnaire were reviewed and then updated from 28 January 2017 to include the following: "How much do you know about the area's history and cultural heritage?" and "How much do you know about the estuary's ecology?" In both cases, a further question was then asked: "Has this knowledge affected the way you use the estuary? Why/why not?"

Of the 42 boat users who were asked this question (post-28 January), 64% (n = 27) claimed to know something about the history and cultural heritage of the area. When asked whether this knowledge affected the way they used the estuary in any way, 67% (n = 28) were mindful of their use, whether that be through respecting culturally sensitive areas, being conscious of noise, looking after nature or sticking to the main vehicle routes, with 30% (n = 13) specifically mentioning the latter. Of those who claimed to know something about the history and cultural heritage of the area, 27% (n = 11) said that knowledge didn't affect the way they used the estuary in any way.

Of the 42 people interviewed at both locations, only 24% (n = 10) expressed some knowledge about the ecology of the estuary. This was despite there being a recently erected information board at Delaware that explains the ecological importance of the Delaware Bay ecosystem (Figure 19). When asked whether that knowledge affected the way they used the estuary, seven people explained that as a result they stuck to the main vehicle tracks on the estuary, avoided areas where seagrass is present, or only launched and retrieved their boats at high tide (to avoid driving over the estuary).

Figure 19. Cawthron summer scholarship student beside Nelson City Council signage at the Delaware Inlet, informing visitors of the importance of estuaries in terms of ecological, recreational and heritage values.

4.6.4. Suggestions for improving boat access in the area

Out of the total of 77 boat users who responded to the questionnaire at both locations, 42% (n = 32) asserted that they wanted boat access in the area to "remain the same" (Table 7). Many of those respondents expressed their attraction to the area as a wild, relatively untouched and isolated recreational location.

Other popular suggestions were to mark a vehicle route (or routes) across the estuary to guide vehicles (17%, n = 13) and to build a ramp at Cable Bay (16%, n = 12). Less frequently mentioned was a suggestion to provide more signage and information at the boat launching sites (6%, n = 5) and to provide more parking space (5%, n = 4). Other suggested alterations to the Delaware Inlet were to widen and smooth out access points onto the estuary, to build a concrete slip, and to provide facilities (such as a toilet).

Others were adamantly opposed to any suggestions for improving boat users' access at Delaware Inlet, claiming that such improvements would likely attract more people to the area and thereby detrimentally impact the natural character of the area.

Table 7. Summary of boat users' suggestions for improving boat access in the area.

Suggestions	Frequency suggested
Keep as is	32
Marked route/s in estuary	13
Ramp at Cable Bay	12
More signage and information	5
More parking space	4
Widen and smooth out access point to Delaware Inlet	3
More facilities at Delaware Inlet	3
Breakwater at Cable Bay	2
Concrete slip at Delaware Inlet	1
Get rid of Cable Bay as a launching location	1
Restrict access	1
Hard fill the shoreline around Delaware Inlet	1
Address boat traffic at Port Nelson	1
Build a boat ramp at the Glen (Glenduan)	1

4.7. Vehicle and boat counts

Fixed cameras were set up at locations overlooking boat launching sites at Delaware Inlet and Cable Bay. Photographic images collected over a period of nine weeks were downloaded and then analysed to tally up the total number of vehicles driving on the beach at each location over a continuous 24-hour, nine week period (Table 8). Note that boat user numbers included kayakers only if a vehicle was used to launch them.

In all but one week (20–26 January 2017), Delaware Inlet was a more popular boat launching site than Cable Bay—averaging more than twice the volume of traffic. Counts were especially high when long holiday weekends coincided with good weather and fishing conditions (Nelson Anniversary on Monday, 30 January and Waitangi Day on Monday, 6 February). The highest count on a single day occurred on Saturday, 25 February, with 33 vehicles at Delaware Inlet and 11 at Cable Bay. A drop-off in vehicle numbers was noted going into March.

Table 8. Number of boat launchings and retrievals at Delaware Inlet and Cable Bay as recorded from time-lapse photography. See paragraph below regarding possible double-counting.

Week	Dates (Friday 12am to Thursday 11.59pm)	Delaware	Cable Bay
1	Friday 6 – Thursday 12 January 2017	61	13
2	13 – 19 January	41	*
3	20 – 26 January	28	38
4	27 January – 2 February	107	49
5	3 – 9 February	82	35
6	10 – 16 February	83	26**
7	17 – 23 February	72	24**
8	24 February – 2 March	99	12
9	3 – 9 March	40	18
Average occurrences per week		**68**	**27**

* No photos were obtained from Cable Bay during this period.
** The fixed camera at Cable Bay was interfered with on 14 February and later corrected on 21 February. During this period the altered field of view may have caused some vehicles to be missed.

The following caveat should be taken into account when considering the data in Table 8. If both launching *and* retrieval of a boat occurred at low or mid tides, then double-counting is likely. Given that individual vehicle data (e.g. registration plates) were not identified from the photographs, it was impossible to determine and hence eliminate instances of double-counting. At high tide at Delaware Inlet, a boat can be either launched or retrieved in only a few minutes from Maori Pa Road and the camera is less likely to have recorded the event (depending on the time-lapse sequencing). Such a boat was likely to be counted only once.

4.8. Interviews with local residents

Eight interviews were conducted with ten residents of Maori Pa Road and Cable Bay to gather their views on boat launching activities at Delaware Inlet and Cable Bay. The interviews established the residents' history in the area; explored the issues concerning protection of the estuary and environs (values, changes observed, feelings, and their personal recreational use); and enquired about ways of finding a solution acceptable to local iwi, local residents and recreational boat users (Appendix 4). The overall results are summarised in Table 9.

Table 9. Summary of interviews with local residents of Maori Pa Road and Cable Bay.

Resident Number	Location	Boat user	What they value about the estuary	Changes in the estuary or people's use	Concerns for estuary	Driving over the estuary	Has rescued stuck vehicles	Build a ramp at Cable Bay?	Open/ close vehicle access
1 & 2	Maori Pa Road	No	Uniqueness, feeling of remoteness	Number of people has increased, more trespassers	Damage to DOC reserve, fires, litter, people not respecting private land	Strongly disagree	No	No answer	Close
3	Maori Pa Road	Yes	Beauty, history, wildlife, recreation	Number of people has increased, end of beach is eroding	Not enough signage, not enough parking at Delaware	Agree	Yes	Disagree	Leave open
4	Cable Bay	No	Beauty, changing views	Number of people has increased, silt and debris from 2012 flood	Not enough parking at Cable Bay, safety of beach users	Agree	Yes, lots at Cable Bay	Strongly disagree	Leave open
5	Maori Pa Road	Yes	Tranquillity, views, access to fishing	None	Maintaining access to Delaware Inlet	Strongly agree	No, but has told them off	Strongly disagree	Leave open
6	Maori Pa Road	Yes	Changing views, recreation	None	Ill-informed people driving over estuary	Agree, but with restricted access	Yes	Strongly disagree	Leave open
7	Cable Bay	No	Naturalness, history	Number of people has increased, spit on Delaware Bay is eroding	Quality of Cable Bay road, noise pollution	Agree, but need to find a compromise	Yes	Disagree	Leave open
8	Maori Pa Road	No	Recreation	Number of people has increased, silt from floods	None	Agree	Yes, one instance where she was asked for help and refused	Disagree, but thinks it would divert people from the estuary	Leave open
9 & 10	Cable Bay	Yes	Access, nature	Increase in sediment from logging in the valley, increase in number of people	None	Strongly agree	Yes	Disagree	Leave open

4.8.1. What local residents value most about Delaware Inlet

The interviews with local residents characterised the community as non-transient, with interviewees residing in the area for an average of 30 years (ranging from 10 to 55 years' residence). When asked "What do you value most about Delaware estuary and why?" most interviewees expressed appreciation for the outstanding natural character of Delaware Inlet: "I value the nature of it, the wildlife, the history, and the opportunity to recreate…" (*Interview* 31 January 2017). Others also appreciated aesthetic and amenity values, commenting on "the pristine, the quietness", the "tranquil" and "ever-changing views", the "beauty", and its ecological uniqueness: "Its naturalness. There's very little human impact on the estuary at this point compared to other estuaries in the area. It's quite unique" (*Interview* 9 February 2017).

Recreational activities were also mentioned by local residents who valued opportunities for multiple recreational uses including swimming, surfing, wind surfing, kayaking, paddle boarding, boating, fishing, horse riding, beach walking and collecting shellfish. Safety for boat launching and fishing with children and families was noted by one interviewee. For another resident, fishing was paramount: "That's the sole reason why we live here; because we love our fishing and we've got access" (*Interview* 5 February 2017). He explained that his boat was custom-built 30 years ago for the sole purpose of launching at Delaware Bay.

Value for the natural history of the Delaware Inlet was mentioned by one resident: "There's a mix of archaeology, so you've got the history. You've got the birds that breed out there, there's fish stock. Occasionally there's surf, which I love to do [surfing] out here. It's just a really beautiful, peaceful place. There's good wildlife" (*Interview* 31 January 2017). A resident of Cable Bay explained: "Because we've been here so long, we also value the history" (*Interview* 9 February 2017).

4.8.2. Residents' observations of changes to Delaware Inlet and Cable Bay

Regarding changes to the estuary at Delaware and to the way that people are using it, a number of interviewees commented on the increased number of people launching boats at Delaware Inlet and the related increase in traffic. That observation included kayakers as well as those using power boats. The increase was explained as a consequence of opening Maori Pa Road to the public in 1999 following approval by Nelson City Council for a subdivision development.

One Cable Bay resident of 42 years commented that the population had doubled in her time of residence, and that the increasing number of people using the area to access the coast was putting pressure on the area. Another long-time resident of Cable Bay confirmed that the number of visitors to Cable Bay had increased rapidly. He explained that parking during peak seasons had become an issue, sometimes requiring the towing of vehicles that blocked facilities on privately owned land. Parking

at Delaware Inlet was also mentioned: "Down the track, there will be issues with where they park; there's only so many vehicles that can fit" (*Interview* 31 January 2017).

Vehicles used to launch boats and 'hoons' getting stuck on the mudflats were specifically mentioned by a number of interviewees with regard to impacts on the estuary. However, disrespectful behaviour also extended to other recreationists and tourists who might assume unrestricted access and thereby trespass on the private road (despite signage) and cross private land without seeking prior permission. As one interviewee summed up: "People think they can come and go out here as they like" (*Interview* 31 January 2017). Concern about the spit (which is partly privately owned) at Delaware Bay included trespassing on private land, people setting fires and littering, and damage to the Department of Conservation reserve. One long-term resident had even been threatened and physically attacked by a trespasser who he had approached to evict from his land.

Some interviewees pointed out concern for erosion at the end of the beach and on the spit at Delaware Bay, but acknowledged that natural processes play a part in that. Other interviewees commented on the impact of floods on the estuary ecosystem, with increased amounts of siltation and debris at times discolouring the estuary.

4.8.3. Residents' views about people driving over the estuary

As summarised in Table 9, most residents (with the exception of two residents interviewed together) agreed that driving over the estuary at Delaware Inlet should be allowed and that access onto the estuary for boat launching should be open to the public. One local resident reported that: "At the moment I have no problem with the usage and, in fact, I really enjoy seeing everyone enjoying it [while] out with their family and friends having a good time" (*Interview* 31 January 2017). The same resident expressed concern about people who "don't know where to go" to launch their boats at Delaware Inlet and consequently end up: "…driving over the eelgrass beds. I don't think that's good. But that's only because of their ignorance; they don't know" (*Interview* 31 January 2017).

It was noted by one resident that those who drive over muddy areas leave behind vehicle tracks for a long time. Another interviewee said that due to the "hard substrate" he considered there to be minimal impact to the estuary by vehicles and that the tide washed away any tyre marks. The same interviewee argued that only a small fraction of the estuary is used and that: "There's not the slightest bit of damage out there at all; that's complete and utter rubbish" (*Interview* 5 February 2017).

The two residents who "strongly disagreed" to vehicular access on the estuary would also like to see a ban applied to horses. All local residents who were interviewed had witnessed vehicles stuck at Delaware Inlet, and nearly all interviewees had at some

stage helped vehicle owners who got into trouble. One local resident recounted an incident where she and her husband refused to use their tractor to help tow a vehicle stuck in mud in the estuary and the vehicle was then submerged at high tide: "Our tractor is worth way more than their car!" (*Interview* 7 February 2017).

Several interviewees characterised the 'offenders' as: "…bloody idiots who have gone for a joy ride or something across somewhere they shouldn't have gone…" (*Interview* 15 February 2017). A similar sentiment reveals local residents' frustration: "You get the odd idiot that goes out there and does donuts and things and drives in silly places, and you think 'well, they get what they get' [i.e. stuck]" (*Interview* 15 February 2017) (Figure 20). However, not all of these people are young or 'hoons'; some are four-wheel drivers and "just people that are ill-informed" (*Interview* 7 February 2017).

In contrast, vehicles driven onto the estuary for the purpose of launching or retrieving boats at Delaware Inlet were considered far less likely to get stuck, as one interviewee explained:

> People with boats are normally pretty responsible, 99 percent of the time. They don't want to lose their boat. They are experienced boaties; they can tow a boat for a start. They wouldn't go out there unless they asked where to go or they probably watched somebody (*Interview* 15 February 2017).

This observation was confirmed by another resident:

> I work here, I look out every day and every night. I see everything that goes on down there [at Delaware Inlet] and I would say it's very rare that you would get someone being a total idiot and driving all over the place. And if they do, they get told off. There's always a local that will yell out at them and give them their opinion (*Interview* 31 January 2017).

One of the local residents who has seen three or four people "going for a hoon" around the estuary described his interaction with the young drivers:

> I've given them a few rark-ups and they've been so apologetic that they've almost been in tears by the time I'm finished with them… They never come back. They say they're sorry, that they didn't realise and it's only because there's no signs (*Interview* 5 February 2017).

Figure 20. A 'joyrider' at Delaware Inlet captured on the fixed camera at mid-afternoon on Thursday 23 February 2017.

4.8.4. Residents' views about building a concrete ramp at Cable Bay

Vehicles getting stuck in the soft sand at Cable Bay when launching or retrieving boats was a far more frequent occurrence according to one interviewee, a long-term resident of the Cable Bay area. He has been involved in many rescues of boats at sea as well as called on to assist boat users' vehicles that get stuck in the sand, which he explained is sometimes due to them using heavy four-wheel drive vehicles to tow large boats. Other times, vehicles get stuck due to the naturally variable condition of the beach where, on a hot summer day, the sand "puffs up" with the heat and is loosened:

> One week they'll pull their boat out okay and the next week they won't… The beach changes so much here; it's hard to know whether you can launch or not on any given day. People will say 'I've done it two or three times, but I got stuck today. Can you pull me out?' (*Interview* 31 January 2017).

Delaware Inlet is recognised by local residents as being safer for launching small boats than Cable Bay. One resident said he had seen three or four boats tip over and someone break their leg. He explained: "It's highly dangerous around there, and not only [because] you have all those people swimming and all those boats getting close. It's just ludicrous!" (*Interview* 5 February 2017).

Local residents were unanimous in their stance that a concrete ramp should not be built at Cable Bay to assist boat users' with launching or retrieving their vessels (with the exception of a resident who offered no opinion). One resident summarised the potential backlash from residents in these terms: "You would open a can of worms in Cable Bay if you talk about building a boat ramp down there. All the Cable Bay people that use the beach, they don't want a concrete ramp and thirty cars and trailers parked down there" (*Interview* 31 January 2017). Another resident asserted: "Putting a ramp in here would be counterproductive to the people that use it. You're doing it for ten fishermen versus one hundred beach users. It's not a place to have a boat ramp" (*Interview* 31 January 2017).

One interviewee considered Cable Bay as too unsafe, regardless of suggested improvements: "Even with a ramp, when you get those big surges you know it's not safe… because of the waves. There's been a few boats driven through the back window of vehicles…" (*Interview* 15 February 2017). Another resident pointed out that the changing geomorphology of Cable Bay means that the boulders are constantly in motion and would quickly destroy a concrete ramp.

Two residents of Cable Bay raised concern about the winding, narrow road to Cable Bay and highlighted potential safety hazards with increased traffic (especially larger vehicles towing boats). Others noted that there is already insufficient parking without the added pressure of more boat trailers. The cost of improving infrastructure along the route would need to be factored in. Another resident of Cable Bay asserted that it was already a congested launching site. This was also noted by another resident: "Ten boats waiting to put their boats back on the trailer, on the boat ramp, with the sea picking up would be really full on; it would be really tense and quite easy to sink a boat" (*Interview* 31 January 2017).

Another Cable Bay resident reported that there is already conflict between boat users, swimmers and families on the beach (all congregated at the far end of the beach), and that this would likely escalate with any improvement to the boat launching area: "You're either going to have a concrete ramp or swimmers: you can't have both… Kids running around and people backing boats—it's a recipe for disaster. It's going to end badly one day soon" (*Interview* 31 January 2017). This scenario is illustrated in Figure 21 below.

Figure 21. An example of a 4WD vehicle towing another 4WD vehicle with boat trailer that got stuck in the soft sand at Cable Bay. The proximity to swimmers and young families on the beach highlights a safety concern. Photo taken on Saturday 4 February 2017.

4.8.5. Summary of local residents' suggestions regarding vehicle access on Delaware Inlet

In the final line of questions put to local residents, interviewees were invited to offer suggestions for improving where and how boat users' launch and retrieve their boats in the area. Interviewees were also asked to state whether they think Delaware Inlet should be closed to vehicles on the estuary and, if so, what the consequences would be for them and for others. They were also invited to offer thoughts on how they might envisage a compromise between local iwi, local residents and recreational boat users. Suggestions are summarised in Table 10.

Table 10. Summary of suggestions made by local residents regarding the future of vehicle access on Delaware Inlet.

Resident Number	Suggestion
1 & 2	A single marked route as a last chance scenario; if someone strays from that route, then close access completely.
3	Two low concrete or stone markers to mark areas where people can launch, speed limit and boat size restrictions, more informative and detailed signage.
4	Put guidelines in place, grade out parking area.
5	A sign with a map showing three main areas that you can launch, indicated by a series of concrete disks; consequences for those caught outside areas.
6	A sign with a map clearly defining three main launching areas where it is safe to launch and where the damage is going to be minimised; restricted access to vehicles launching and retrieving boats.
7	Designate areas where you can drive and mark with stakes in the ground, access restricted to vehicles launching and retrieving boats, booking at peak holiday periods.
8	A sign with a diagram showing an area that you can launch in, buoys or something to indicate this.
9 & 10	Low fibreglass poles to indicate areas where people can launch, a simple sign telling people to take care and why.

Some interviewees asked that iwi be consulted and one local resident said that: "…there's grievance there and we need to respect that's where they're coming from" (*Interview* 31 January 2017). The same resident suggested that iwi be invited to identify on map signage any areas they don't want people to go or to "have it worded with a little marker" (*Interview* 31 January 2017). Another resident expressed their desire for the community to come together on this issue, and not be divided by it. The resident suggested that a facilitated meeting would require those attending to consider the following: "Being sensitive to each other's needs and recognising that all of the users care about the environment. It's about respecting it and the space, and creating safe usage for the environment and for the people" (*Interview* 7 February 2017).

Regarding residents' views on whether Delaware Inlet should be closed to vehicles, two residents stated that they wished to see Delaware Inlet permanently closed to all vehicles and horses. When questioned further, they were willing to seek a compromise and suggested a single marked route on the estuary with the proviso that if vehicles deviate from that route, then the estuary be permanently closed to all vehicles.

Other local residents expressed unease about potential backlash if the Delaware Inlet was closed to vehicles, as one resident explained: "I think that there would be a

tremendous amount of resentment between locals and it would cause a lot of tension if it was closed off completely. It has the potential to get very political—people will not rest" (*Interview* 9 February 2017). Another resident affirmed that opinion: "It's never going to happen. If they [Nelson City Council] ever think they are going to shut it, they're in for a way bigger fight than they realise. And I tell you what—it'll get nasty" (*Interview* 5 February 2017). The same resident threatened personal action: "As long as I've got a machine, there's no way you'll ever put a gate up there. It'll get ripped out!" (*Interview* 5 February 2017).

Other local residents interviewed offered a range of potential solutions which they considered to be fair to everyone. Many suggested better signage with information about the history, wildlife and cultural heritage of the estuary; notification for keeping dogs under control; and a map indicating three areas to launch boats from.[16] Limiting this information to one sign was considered appropriate in order to prevent visual pollution: "We want to see the beauty of the place, not damn signs" (*Interview* 5 February 2017). Others agreed that an information sign should contain content such as: "…respect the estuary, don't drive around here" (*Interview* 31 January 2017).

Most interviewees suggested a marked route across the estuary to minimise damage and limit vehicle impact to a small section of the estuary. It was suggested that such a route could take the form of: "At low tide all you would need is two concrete or stone markers, or even one. Just have a little thing on the map saying this is where you launch at low tide" (*Interview* 31 January 2017). Another resident detailed that the markers could be a series of concrete disks with a white dot; easy to see when you're driving but not visible from far away. It was pointed out that is was unnecessary to have markers at high tide (as boats can be launched directly from the road), and so markers that are low and submersible were regarded as most appropriate: "It doesn't have to be a great big pole sticking up!" (*Interview* 31 January 2017). In contrast, someone else suggested the use of "a couple of white fibreglass poles" (*Interview* 15 February 2017). Suggestions for specific places where marker routes could be placed were outlined by some residents, and it was recommended that frequent boat users should also be consulted for their existing knowledge of the channel and best launching spots at different tides.

In addition to a marked route, some local residents expressed interest in implementing other restrictions such as a speed limit for motor boats and a size limit for boats (i.e. under six metres in length). It was suggested that larger boats can launch from Nelson port, whereas smaller boats are better suited for Delaware Inlet which is safer given that it's sheltered from the sea. Another resident suggested restricting vehicles only to those who are launching or retrieving "marine craft" (including kayaks, paddleboards). Others wished to discourage jet skis—both at Delaware Inlet and Cable Bay, largely

[16] Note that there is already an information sign at Delaware informal boat launching site that outlines the ecological value of the estuary (Figure 19).

as a result of the noise they generate. Another resident suggested that at peak holiday times, people may need to book to reserve a parking space as this is already an issue at Cable Bay.

One resident was particularly interested in the ecological results of this study, and reasoned that if vehicles were proven to cause a lot of damage to the shellfish beds, then restrictions should apply. That could include tidal restrictions, limiting launching or retrieving boat to low or high tides (thereby excluding mid-tide launching sites). The natural changeability of the estuary and shifting areas of soft and hard sand would require that any designated launching sites be re-evaluated on a frequent basis. This might also influence where different-sized boats could be launched from. Another resident was convinced that vehicles do not cause any damage to the estuary, and claimed that sediment transported by rivers into the estuary is more harmful. He voiced concern that that the ecological results from this study will reflect badly on boat users.

Many residents conceded that it would be difficult to enforce any restrictions that the Nelson City Council might apply. One resident reflected: "You can't force people to stick within a boundary, but you can only request that they do and put something up that gives them a guideline" (*Interview* 15 February 2017). The two residents who are opposed to vehicle use on the estuary were not convinced that boat users would comply: "…the arrogant ones will never change, whatever restrictions you put in place" *(Interview* 31 January 2017). One local resident suggested that the Council could fine (up to $500) those who deviated from an agreed marked route. It is noted that currently local residents, by default, monitor and 'enforce' vehicles stuck at Delaware Inlet and Cable Bay, and those who trespass onto private land. In at least one incident reported to Cawthron researchers, a resident has been involved in a physical altercation with a trespasser (which was reported to police).

4.9. Interview with Trustee of Ngāti Tama ki Te Waipounamu Trust and Te Huria Matenga Wakapuaka Trust

A Cawthron social scientist interviewed a Trustee of Ngāti Tama ki Te Waipounamu Trust and Trustee Chair of Te Huria Matenga Wakapuaka Trust at the Cawthron Institute on 8 March 2017. The Ngāti Tama ki Te Waipounamu Trust[17] represents "Ngāti Tama people within the rohe of Wakapuaka down to the West Coast" (*Interview* 8 March 2017). The interviewee is also a Trustee of Te Huria Matenga Wakapuaka Trust set up in 1986 by Judge Isaac under Te Ture Whenua Māori Act 1993. The Wakapuaka 1B Trust, the farm adjacent to the Delaware Inlet, was formerly under the Huria Matenga title.

[17] This is the post-Treaty settlement name of what was formerly the Ngāti Tama ki Te Tau Ihu Trust.

4.9.1. Mana whenua of Wakapuaka rohe

The Ngāti Tama trustee stated that, as mana whenua, the ability to express rangatiratanga with respect to the moana, whenua and awa (sea, lands and rivers) within the rohe of the Delaware Inlet is as important as the ability to exercise kaitiakitanga in protecting those natural resources.[18] The introduction of the Foreshore and Seabed Act 2004 detrimentally affected the ability of Ngāti Tama to exercise their full rights and responsibilities as mana whenua of the Delaware Inlet. As the interviewee explained: "They set the boundaries which you could partake actively in marine areas. It gives no recognition to our 'supermarket' that's there, our 'motorway' that's there" (*Interview* 8 March 2017).

According to the interviewee, following the Supreme Court decision, there are three options Ngāti Tama could pursue with regard to their rights and interests in the Delaware Inlet. They could apply to amend the certificate of title, they could claim customary protective rights, or they could claim customary marine title. Regarding the first option, the interviewee doubted it would be successful, "given the way that records have been held". The second option, customary protective title, allows continuation of customary activities and would give Ngāti Tama a governance role with the Department of Conservation and Ministry for Primary Industries. However, protective title provides no ability to undertake commercial activities, whereas this would be possible under the third option, customary marine title. The interviewee commented:

> Just having a look at it, personally I think customary marine title may be the more beneficial to us looking at future aspirations if we so chose to do a commercial activity within that area. Protected customary right doesn't give us that ability, so personally I'd like to go down customary marine title which allows for commercial activities or research. I see it as prime area for research involving both the taiāpure and the marine reserve. But then to do research you need to have capital behind you, so you need to be looking at them both working together in some areas (*Interview* 8 March 2017).

The Treaty of Waitangi settlement Wai 785 (Te Tau Ihu o Te Waka a Maui, Northern South Island Claims) provided iwi in the Top of the South with clearer status in forming direct relationships with Government and government departments. The Ngāti Tama interviewee reported that relationships with operational and managerial staff in Nelson City Council and the Department of Conservation, as well as consultants employed by both, were generally positive: staff are "extremely helpful" and

[18] *Rangatiratanga*: chieftainship, right to exercise authority, chiefly autonomy, chiefly authority, ownership, leadership of a social group, domain of the *rangatira*, noble birth, attributes of a chief. *Kaitiakitanga*: guardianship, stewardship, trusteeship, trustee. Sourced from: http://maoridictionary.co.nz/

understand "the ramifications from [the] Treaty settlement and what [the] obligations are for Nelson City Council" (*Interview* 8 March 2017). As the interviewee explained:

> The fisheries settlement … started the ball rolling for iwi to have some sort of autonomy out there in the community…, but the Treaty of Waitangi [settlement] actually gave us a bit of teeth to be working with councils and [other organisations based on our] statutory declarations from Government and obligations of councils and government departments (*Interview* 8 March 2017).

4.9.2. Aspirations for kaitiakitanga and rangatiratanga with respect to Wakapuaka

In 2002 Ngāti Tama applied for, and were granted, a taiāpure-local fishery under section 181(9)(b) of the Fisheries Act 1996. The taiāpure is for a small special purpose area and covers over 15 km of coastline extending up to 4 km offshore from Cable Bay to Whangamoa Head in northern Tasman Bay. The resultant 'Whakapuaka Taiāpure' forms part of Ngāti Tama's aspirations for rangatiratanga, as summarised in the *New Zealand Gazette*:

> The application by Ngāti Tama seeks by means of a taiāpure to administer and control their fisheries and is a major element of rangatiratanga. The fact that Ngāti Tama seek to exercise that management and control by virtue of a consultative process with all interested parties, does not detract from their rangatiratanga but enhances it (Hodgson 2001, p.2320).

The negotiations between the Taiāpure Management Committee and the commercial fishing sector resulted in a 'gentleman's handshake' that the commercial sector would not fish within the taiāpure area (*Interview* 8 March 2017). According to the interviewee, this voluntary agreement has generally been respected by commercial fishers, although some transgression across the taiāpure boundary at night has been noted by locals. The pressure of increased numbers of recreational fishers, with unimpeded access via the Delaware Inlet boat launching site, has again raised concern for mana whenua about the ecological fragility of the estuary and the sustainability of surrounding coastal and marine environments.

The Taiāpure Management Committee and the Department of Conservation contracted NIWA to map the rocky reefs and other seafloor features using a submersible to take photographs of the substrate on the bottom (Grange 2005). The Taiāpure Committee wanted a detailed picture of the location of different habitat types and resources (e.g. reefs are habitats for kina and crayfish) to assist with management decisions. The interviewee, currently Chair of the Taiāpure Committee, expressed interest in supporting further scientific research on the local ecology (particularly on the kina barrens) within the boundaries of the taiāpure. However, lack of financial resources is limiting further research. The potential benefit of comparative

research across different management regimes within the region was highlighted in the following passage:

> To be able to do viable research in the future with comparisons of that area [the Wakapuaka taiāpure], the outside area where commercial activity goes on (bottom trawling, scallops and trawling) and the marine reserve—so, you've got an area of 'no take', an area of recreational take and commercial, [and an area of just] recreation—there could be value in having those areas for the sake of research (*Interview* 8 March 2017).

Research on the ecology of the Delaware Inlet is seen as vital to Ngāti Tama's ability to exercise their ancestral duty as kaitiaki with respect to their taonga. Similarly, a duty to provide for present and future generations' needs through the creation of socioeconomic opportunities (e.g. jobs and education) is seen as critical to the future of a people who wish to continue to reside within their rohe (tribal territories). The interviewee alluded to this in the following:

> Why should one have to move from an area of association instead of being able to… [live and work here]? Okay, we might not have jobs and that here, but you could create jobs. Aquaculture—there's opportunities there. It's [the Foreshore and Seabed Act 2004] just taking away an ability for whanau/hapū to be able to develop (*Interview* 8 March 2017).

Under the operative Nelson Resource Management Plan, aquaculture structures are currently prohibited in estuaries, including Delaware Inlet. The interviewee expressed frustration at the differential treatment of aquaculture and driving on the estuary, both in terms of consent status and enforcement:

> I went to Nelson City Council to have a look about doing a commercial activity on the estuary in aquaculture. I got told it wasn't a permitted activity. Then I read through their [regional coastal] plan and I see that launching and retrieving vessels on the estuary is not a permitted activity. So, it makes me wonder why a small group of the community with short association to the area are allowed to do this when we've had continuous association with the area and we can't move forward (*Interview* 8 March 2017).

4.9.3. Concerns about impacts on Delaware Inlet

The Ngāti Tama interviewee noted that there is a lot more activity on the estuary now: "In the last 12 months I think there's been three vehicles that have been stuck there; two have been totally submerged. You've got vehicles, people just driving all over the

place on it" (*Interview* 8 March 2017). The interviewee noted that most boat users who drive over the estuary to launch or retrieve boats do not get their vehicles stuck: "…it's only the joyriders that are getting stuck, going into stupid areas" (*Interview* 8 March 2017) (Figure 20, Section 5.8.3).

The interviewee was concerned about the impact of vehicles on the cockle habitats: "As they're driving over them now, they're compacting the dirt and lessening the biomass within that area. Even though it's not great or the sizes aren't great, [in] the end, that's an animal that's been in that area longer than we've been in Aotearoa" (*Interview* 8 March 2017). Although not specifically mentioned by the interviewee, the destruction of cockle habitats would negatively impact the ability of Ngāti Tama to collect shellfish and exercise mahinga kai (traditional food gathering), which is part of an iwi/hapū's ability to express their mana as tangata whenua when hosting manuhiri (visitors).

Siltation in the estuary was also highlighted as a concern, resulting from human habitation, farmland, forestry, deforestation and "farmland slippages" (erosion on hillsides exacerbated by high rainfall events). Other impacts incur offshore: "I've even heard [name omitted] picked up about three 20 litre used oil containers off the front out here [end of the spit]. [They] came off a ship or someone… going out and dropped it off" (*Interview* 8 March 2017).

On Delaware spit, increased dog activity from recreationists exercising their pets was noted by the interviewee as a threat to nesting birds. Sand dune instability was also raised as an impact due to people making pathways through the sand dunes and the southerly or offshore wind further opening up those pathways, thereby increasing dune erosion and habitat loss for nesting birds.

Other recreational activities have had a direct cultural impact on Ngāti Tama, including the following episode:

> This here [pointing on the map] used to be an area… well it is still, an urupa [burial ground] in there. It used to be an island when I was a kid; now it's eroded away and it's just a build-up of shell midden. We had people coming over here, driving to there and digging up the shell… They were digging up the shell to put on their driveway to have a nice driveway. It was in fact an old urupa and I had this chappie bring up someone's skull and saying 'my boy found this'! So I then turned it back over to the urupa over here [another location] (*Interview* 8 March 2017).

4.9.4. Ngāti Tama interviewee's preferences regarding vehicle access on Delaware Inlet

When asked "what does Ngāti Tama and the Trust feel about people driving over the estuary?" the interviewee responded: "Well, Huria Matenga Trust are very much

against it" (*Interview* 8 March 2017). The interviewee affirmed that Ngāti Tama members do not use the Wakapuaka Inlet to launch boats. When asked what the consequences would be for Ngāti Tama if the Inlet was closed to vehicle access, the interviewee explained:

> One, [in] the kaitiaki sense we would be protecting that area… Other than that, I couldn't see anything in terms of consequences, other than stopping us from being able to go forward in doing aquaculture within there. Possibly, hikoi [journeys] with clear bottom barges as in tours over the estuary. Kayaking—that wouldn't be a problem… (*Interview* 8 March 2017).

Noting that Te Huria Matenga Trust are opposed outright to vehicles accessing and driving over the estuary—whether for the purposes of launching a boat or other recreational activities such as walking the dog or gathering cockles—a follow-up question was posed: "If vehicle usage were to continue to occur, what are your suggestions for improving how or where they [vehicle users] launch in this area?" The Ngāti Tama interviewee responded as follows:

> A wooden ramp down to the low tide of a channel and reverse all the way down there. Otherwise you're still going to have people going off [to the sides of a single track]. You might put markers out, [but] if someone sees 'oh, it'll be better I don't have to go as far if I can go down here, I'll take off onto another area.' But if there's only access onto that ramp, and that was it… It's the only way to really control that area or to control the activity of driving down there, so it's specifically for launching and retrieving (*Interview* 8 March 2017).

Regarding the cost of constructing a wooden ramp, the interviewee suggested:

> Huge cost, I know. 'No cost' would be to stop [access] altogether… we could easily have 'user pays' [to pay for the ramp]. For using the boat ramp down on the [Port Nelson] wharf, they pay. You go to Kaiteriteri, you pay for the boat ramp there. [If] people want to use it, it's user pays—they pay (*Interview* 8 March 2017).

The interviewee was in favour of improving the concrete ramp for launching boats at Cable Bay and upgrading it to a "proper concrete pad much like [at] Kaiteriteri" (*Interview* 8 March 2017), although also cognisant of the local conditions when the afternoon sea breeze picks up and issues such as limited parking space at Cable Bay. The interviewee asserted: "I fully support improving that area because it's a recognised area [for launching boats]" (*Interview* 8 March 2017).

When asked about the option of having a marked route onto the estuary, as some local residents and boat users suggested, the Ngāti Tama interviewee considered that

option unlikely to deter those who are causing problems. Signage to dissuade vehicle access was similarly considered an inadequate measure: "If there's access onto the estuary, you're always going to have those small minority that are going to see how far they can go" (*Interview* 8 March 2017).

The Ngāti Tama interviewee reiterated an aspiration to developing aquaculture in the local area:

> If [Nelson City] Council was to allow for [aquaculture as] a permitted activity, then I would expect them to allow our hapū to look at aquaculture within the estuary as well as research. We were looking to do research on geoducks [large clams] in the estuary, but because it's not a permitted activity we couldn't do something as simple as that (*Interview* 8 March 2017).

4.10. Assessment of options

Table 11 provides a preliminary assessment of options that have been identified in the course of this study. Some options could be implemented in conjunction with others. Regular scientific monitoring of the ecological effects of any vehicle usage at Delaware Inlet has been included at the suggestion of Nelson City Council staff. A more complete assessment would require further consideration and consultation with affected parties.

Table 11. Preliminary assessment of options for boat access at Delaware Inlet and Cable Bay.

Option	Pros	Cons
Status quo	Low financial cost (at least in short term).	Damage to estuary and associated cultural values continues. Rules in NCC coastal plan not being enforced.
No vehicle access to estuary at Delaware Inlet	No more damage to estuary (assuming rules can be enforced). Potential for seagrass rehabilitation.	Enforcement could be difficult and/or expensive. Safety issues for boat users. Renewed animosity between residents, iwi and boat users.
Marked route(s) at Delaware Inlet to limited number of launching points	Reduced damage to estuary. Potential for seagrass rehabilitation outside marked route(s).	Not all vehicles will stay on route. Some ongoing impacts to estuary. Some maintenance required of route markings.
Long wooden ramp at Delaware Inlet	Minimises on-going damage.	Cost. Structure would have visual effects, some shading effects and changes to currents. Possible damage to estuary during construction phase. On-going maintenance required.
Improve facilities at Delaware Inlet; booking system for parking	Improves experience for users.	Cost. Likely to lead to increased use and therefore more damage to estuary.
Improved signage about values of Delaware Inlet	Greater environmental awareness by boat users. With other measures, could help to reduce impact on estuary.	Unlikely to deter 'joyriders' and some boat users from inappropriate behaviour. Damage to estuary and associated values continues.
Restrictions on users of Delaware Inlet e.g. boat/trailer size limits; no jet skis	Reduced ecological and other impacts (depending on restrictions).	May be difficult to enforce.
Install concrete ramp and improve other facilities at Cable Bay	Safer and better experience for users. Some users diverted from Delaware Inlet so reduced impact to estuary.	Increased congestion at Cable Bay, conflict with beach users. Construction cost, with on-going maintenance. Cable Bay still not safe in some conditions.
Regular monitoring of Delaware Inlet	Provides basis for periodic review of approach.	Cost. May not provide definitive conclusions.

5. SUMMARY OF KEY FINDINGS

5.1. Summary of ecological assessment

Vehicle usage zones covered a relatively small amount (2%) of Delaware Inlet but represented 16% of seagrass beds within the estuary. Visible vehicle tracks showed direct physical disturbance to seagrass and other benthic habitats in areas subject to both higher and lower amounts of vehicle usage. It is likely that other vehicle-related ecological impacts are also occurring in midshore zones, including sediment compaction, differences in infaunal community composition and lower infauna abundance, including reduced cockle numbers.

The number of epifauna taxa was lower at the higher vehicle usage zones in the low shore, although the effects of this could not be separated from the influence of grain size composition. Likewise there was some evidence to suggest an historic impact of vehicle usage on seagrass distribution although the effects of this could not be separated from the influence of gravel field substrate. Nearly complete loss of seagrass patches higher up the shore also suggested impacts of vehicle usage, although this could not be confirmed due to differing mapping methodologies, naturally occurring contraction of seagrass beds, and consequences of potential habitat deterioration not related to vehicle impacts.

The 2017 survey results provide a point-in-time benchmark that could be used to track any future changes in the integrity of seabed habitats with regard to effects of higher vehicle usage.

5.2. Summary of social and cultural impacts

Over thirteen non-consecutive days in January and February 2017, 115 boat users were observed accessing Delaware Inlet and Cable Bay. In all but one week in January, Delaware Inlet was twice as popular for boat launching than Cable Bay—averaging 68 occurrences per week as opposed to 27 on average at Cable Bay. Numbers were particularly high when long holiday weekends coincided with good weather and fishing conditions.

Of the 77 boat users surveyed at Delaware, the majority wanted boat access in the area to “remain the same”, meaning continuing the full unimpeded access of vehicles across the tidal flats at Delaware Inlet. Other popular suggestions were to mark a vehicle route (or routes) across the estuary to guide vehicles, and to build a ramp at Cable Bay. Less frequently mentioned were suggestions to provide more signage and information at the boat launching sites, create more parking space, improve access points onto the estuary, build a concrete slip at Delaware Inlet, and provide facilities (such as a toilet). A small number were adamantly opposed to any improvement for

boat users' access at Delaware Inlet, claiming that such improvements would likely attract more people to the area and thereby detrimentally impact the natural character of the area.

Local residents noted a substantial increase in vehicle numbers at Delaware Inlet since 1999 when Maori Pa Road became open to the public. The majority of local residents interviewed supported the following: marked route(s) across the estuary to contain vehicles launching boats at low- and mid-tides to a defined path(s), better signage with information and maps, and restrictions on boat size and a speed limit for motor boats. No residents were in favour of building a concrete ramp for boat launching at Cable Bay, citing factors that make this a challenging and sometimes dangerous place to launch at the best of times.

Many residents mentioned the nuisance of 'joyriders' at Delaware Inlet who drive away from the main routes taken by vehicles launching boats, thereby extending the area of impact and sometimes getting their vehicle stuck. Some local residents suggested harsher penalties for those who deliberately deviate from a marked route, although others noted the difficulty in enforcing regulations given the relative isolation of Delaware and Cable bays.

Unimpeded public access does not respect the concerns or mana of Ngāti Tama ki Te Waipounamu. Te Huria Matenga Trust remains opposed to all vehicle access to the tidal flats at Delaware Inlet. They would prefer that the recognised boat launching site at Cable Bay be improved. They consider that a marked route across the estuary at Delaware Inlet would be ineffective; rather, containing boat users to a single wooden ramp was offered as a measure to protect the ecology of the estuary by ensuring that vehicles did not directly drive across and therefore impact the shellfish beds and eelgrass. It was suggested that the cost of such a ramp could be met through user charges.

A taiāpure was established in Delaware Bay in 2002 and Ngāti Tama are looking at options for further research as well as opportunities to provide socioeconomic benefits for their people, potentially including aquaculture. To support this, the Trust has recently applied for a customary marine title to the Wakapuaka estuary, which may enable Ngāti Tama to better express kaitiakitanga and rangatiratanga in their rohe.

We have provided an initial assessment of options that have been identified in the course of this study (see Table 11). A more complete assessment would require further consideration and consultation with affected parties.

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8. APPENDICES

Appendix 1. Hill Laboratory results for grain size and PAH.

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Dry Matter	Drying for 16 hours at 103°C, gravimetry (Free water removed before analysis).	0.10 g/100g as rcvd	1-8
3 Grain Sizes Profile*		0.1 g/100g dry wt	1-8
3 Grain Sizes Profile			
Fraction < 2 mm, >/= 63 µm*	Wet sieving using dispersant, 2.00 mm and 63 µm sieves, gravimetry (calculation by difference).	0.1 g/100g dry wt	1-8
Fraction < 63 µm*	Wet sieving with dispersant, 63 µm sieve, gravimetry (calculation by difference).	0.1 g/100g dry wt	1-8

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Polycyclic Aromatic Hydrocarbons Trace in Soil	Sonication extraction, SPE cleanup, GC-MS SIM analysis US EPA 8270C. Tested on as received sample [KBIs:5784,4273,2695]	0.002 - 0.010 mg/kg dry wt	1-2
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2

Appendix 2. Boat User Survey–Observation Chart.

Boat User Survey – Observation Chart

Record number	Location C/D	Date	Time	High Tide*	Weather Conditions	Wind speed**	Type of boat i.e. motorised launch, kayak	Number of occupants	Length of boat	Horsepower of boat	Size of vehicle ***	Vehicle track recorded Y/N

Key:
Location C=Cable Bay, D=Delaware Estuary
*Tide information taken from Land Information New Zealand (LINZ) website and rounded to the nearest 5 minute interval.
**Wind speed categorised as either calm, light, moderate or strong
***Size of vehicle will be categorised by 2WD, 4WD or van.
Vehicle track recorded Y=Yes, N=No.

Appendix 3. Boat User Survey–Qualitative Questionnaire.

Boat User Survey – Qualitative Questionnaire

*Adapt questions according to the timing of the interview, the tide and any previous observations

Record number:

1. Where have you come from today? i.e. Stoke, Richmond, Nelson
2. What is your main activity for today?
3. How long do you plan on being out for? Or when did you depart?
4. What length is your boat in metres or in feet?

   - How much horsepower is it?
5. What is the make and model of your car? Is it 4WD?
6. How often do you use this boat ramp? How many times have you used it in the past month?
7. Why do you use this particular location to launch?
8. What other boat ramps in the area (if any) do you use?

   - What makes those boat ramps better/worse?

   - Do you ever use Cable Bay? Why Cable Bay over Delaware estuary? Why Delaware estuary over Cable Bay?
9. How much do you know about the area's history and cultural heritage?

   - Has this knowledge affected the way you use the estuary in any way? Why/why not?
10. How much do you know about the estuary's ecology?

    - Has this knowledge affected the way you use the estuary in any way? Why/why not?
11. What suggestions do you have for improving boat access in the area? Cable Bay included.
12. What would you like Delaware estuary to look like in the future?

Additional comments

Appendix 4. Interview Questions–Local Residents.

Name: _____
Date: _____

About the resident

How long have you lived at this residence (or in the area)?

Exploring the issues *(What are we protecting?)*

What do you value most about Delaware estuary? Why?

Throughout the time you have lived here, have you noticed any changes in the estuary or in the way people are using it?
- If so, do these changes concern you? Why/why not?

How do you feel about people driving over the estuary?

Do you have a boat?
- If so, how often do you use Delaware estuary for boating purposes?
- Where do you tend to launch and load? (Show on map)
- How often do you use Delaware estuary for other purposes? Give examples.

Have you witnessed any boat users getting stuck coming back in or going out?
- How often do you hear about this happening?
- Where does this commonly occur? (Show on map)
- Have you had to assist in anyway? And if so, does this bother you?

Exploring solutions (*What is fair to everyone? What is the wise way?)*

What are your suggestions for improving where and how boat users launch boats in this area?

What is your opinion on building a concrete ramp at Cable Bay?
- Do you think this would redirect boat users from Delaware to Cable Bay? Why/why not?

Do you think Delaware estuary should be closed to vehicle access or vehicle access should continue?
- If it were closed, what would the consequences be for you and for others?

Finding a solution *(What needs to happen? Who can help? How can we all work together?)*

Can you envisage a compromise between local iwi, local residents and recreational boat users? What would it look like?

How can everyone work together to make that happen?

Any further comments? Thank you very much.

Appendix 5. Interview Questions – Ngāti Tama ki Te Waipounamu Trust.

Ngāti Tama ki Te Waipounamu Trust / Te Huria Matenga Wakapuaka Trust
Names: _____
Date: _____

About Ngāti Tama

For practical purposes, are you able to speak for both Ngāti Tama ki Te Waipounamu Trust and Te Huria Matenga Wakapuaka Trust? Are their opinions the same?

Could you please share with us some of the early history of the area, particularly from the 1820s onwards when Ngāti Tama came here from Taranaki?

We understand that the Māori Land Court confirmed Ngāti Tama's title to the estuary in 1988 and 1998, but that this was appealed to the High Court and then the Court of Appeal:

- What is the current land title status regarding the Wakapuaka (Delaware) estuary?
- How has your ability to exercise your title been affected by the Foreshore and Seabed Act 2004?

Has the Treaty of Waitangi Settlement (Te Tau Ihu o te Waka a Maui, Wai 785) changed things, i.e. enabled Ngāti Tama to express te tino rangatiranga or fulfill kaitiaki responsibilities over the Wakapuaka and adjacent whenua and moana? How? Why/why not?

Exploring the issues *(What are we protecting?)*

Has the Wakapuaka Taiāpure (est. 2002) been effective in enhancing the ecological and cultural relationships that Ngāti Tama sought to protect?

Who owns the land on which the urupa is located? *[NB: The block containing the cemetery with Huria Matenga's grave was sold in the 1930s.]*
- Is current protection of the urupa sufficient? If not, how might that be improved?

Over time, have you noticed any changes in the estuary or in the way people are using it?
- If so, do these changes concern you? Why/why not?
- What do you think is being damaged or threatened by this activity?

How does Ngāti Tama and the Trust feel about people driving over the estuary?

Do Ngāti Tama members use Wakapuaka/Delaware estuary for boating purposes?
- Where do they tend to launch and load? (Show on map)
- How often do you/others use Wakapuaka/Delaware estuary for other purposes? Give examples.

Have you witnessed any boat users getting stuck coming back in or going out?
- How often do you hear about this happening?
- Where does this commonly occur? (Show on map)
- Have you had to assist in anyway? And if so, does this bother you?

Exploring solutions

What are your suggestions for improving where and how boat users launch boats in this area?

What is your opinion on building a concrete ramp at Cable Bay?

- Do you think this would redirect boat users from Wakapuaka/Delaware to Cable Bay? Why/why not?

Do you think Wakapuaka/Delaware Estuary should be closed to vehicle access or vehicle access should continue?

- If it were closed, what would the consequences be for Ngāti Tama and for others?

Finding a solution *(What needs to happen? Who can help? How can we all work together?)*

Can you envisage a solution that would be acceptable to all parties – Ngāti Tama, local residents and recreational boat users? What would it look like?

The widespread consultative process that Ngāti Tama undertook in preparation for the Wakapuaka Taiāpure was praised by the Tribunal. What lessons could you offer from that experience in terms of how all parties might come together to reach agreement/resolution with respect to the Wakapuaka estuary?

Any further comments? Kia ora and thank you very much.

Appendix 6. Average abundance of epifauna taxa, and % cover of vegetation, at the vegetated low shore (V) and unvegetated midshore (U) survey sites subject to low (L) and high (H) vehicle usage in Delaware Inlet. Each site has three replicates (n = 3).

Taxa name	Common name	HV1	HV2	HV3	LV1	LV2	LV3	HU	LU
Cominella glandiformis	Mudflat whelk		0.3		0.7	1.0	0.3	0.7	
Cominella maculosa	Spotted whelk					0.3			
Diloma surostrata	Mudflat topshell	0.3		2.7	2.0	8.7	1.0	1.3	1.0
Micrelenchus tenebrosus	Topshell	60.3	5.0	6.3	21.3	5.7	33.7		
Zeacumantus subcarinata	Small spire shell							0.3	
Zeacumantus lutulentus	Spire shell				0.7			1.0	
Notoacmea helmsi	Estuarine limpet	4.3		1.7	6.7	0.3	0.3	1.0	1.7
Lunella smaragdus	Cats eye		0.3	2.0		4.0	0.3		
Austrovenus stutchburyi	Cockle	12.3	2.0	0.3	17.3	4.3	7.0	1.7	2.7
Perna canaliculus	Green mussel						0.3		
Chiton glaucus	Chiton					0.7			
Patiriella regularis	Starfish					0.3			
Halicarcinus sp.	Pilbox crab					0.3			
Hemiplax hirtipes	Stalk eyed mud crab	0.7							
Sphaeromatidae	Isopod				0.3				
Austrominius modestus	Estuarine barnacle	0.3			0.3				
Tubeworm						5.3			
Anthopleura aureoradiata	Mudflat anemone	10.3			18.7		4.7		
	Total average epifauna abundance per core (± 1 SE)	88.7± 10.9	7.7± 2.4	13.0 ± 5.6	68.0 ± 5.0	31.0 ± 6.1	47.7 ± 13.7	6.0± 0.6	5.3 ± 1.5
	Total average no. epifauna taxa per core (± 1 SE)	5.0± 0.6	2.7± 0.3	3.7± 0.9	7.0± 0.6	6.7± 0.9	4.7± 1.5	4.0± 0.0	2.3± 0.3
Ulva (%cover)	Sea lettuce	0.3	0.7						
Gracilaria (%cover)	Agar weed							<0.7	
Zostera muelleri (%cover)	Seagrass	89.3	28.7	54.7	78.7	76.7	88.0		
Unidentified red algae (%cover)									< 0.3

Appendix 7. Abundance of infauna taxa at the vegetated low shore (V) and unvegetated midshore (U) survey sites subject to low (L) and high (H) vehicle usage in Delaware Inlet. Each site has three replicates (n=3).

Taxa name	Common Name	HV1	HV2	HV3	LV1	LV2	LV3	HU	LU
Anthopleura aureoradiata	Mud flat anemone	9.7			1.3		2.3		0.3
Edwardsia sp.	Burrowing anemone					0.3			
Nemertea	Proboscis worms	1.3		1.0		1.7	0.3	1.0	0.3
Nematoda	Roundworm			1.0	0.3	0.7	1.7		
Chiton glaucus	Green chiton		0.3	0.3					
Lunella smaragdus	Cats eye			1.0		1.3	0.3		
Cominella glandiformis	Mud flat whelk	1.3	0.3	1.3	1.0	0.7	2.0	0.7	0.7
Diloma subrostrata			0.3	1.0	0.7	2.0	0.3		1.0
Micrelenchus huttoni	Small top shell	4.7	0.7	0.7	8.0	0.7	11.3		
Notoacmea sp.	Limpet	1.3	4.7	1.7	1.3	1.7	1.0		0.7
Zeacumantus lutulentus	Spireshell								0.7
Haminoea zelandiae	Bubble shell	0.3							
Bivalvia			0.3	0.7					
Nuculidae				0.3					
Arthritica bifurca	Small bivalve	21.3			15.7	0.3	35.3	0.3	6.0
Austrovenus stutchburyi	Cockle	23.0	15.3	13.3	7.3	14.0	23.3	22.0	59.3
Lasaea parengaensis									0.3
Linucula hartvigiana	Nut shell	1.0	0.3	3.7	1.3	1.3	1.7		0.3
Macomona liliana	Wedge shell/ Hanikura	3.3	1.3	4.0	3.7	0.7	9.0		0.7
Musculus impactus				0.3					
Paphies australis	Pipi		1.0						
Soletellina sp.	Golden sunset shell	1.3	1.3				0.3		0.3
Oligochaeta	Oligochaete worms			1.0		4.7	0.7		
Polydorid		0.3		2.0		12.7			
Lagis australis			0.3						
Orbinia papillosa							0.3		
Scoloplos sp.				0.3					
Paraonidae		1.0		5.3	2.3	4.3	1.3		
Aonides sp.		0.3		0.3		8.3			
Prionospio aucklandica		32.3	7.7	64.7	28.7	69.3	22.7	2.7	1.0
Prionospio sp.		0.3	1.3	5.3	2.3	5.7	0.3	3.3	
Capitellidae		7.3	1.3	37.7	4.0	24.3	16.0	0.3	0.3
Barantolla lepte			3.3	7.0		25.7			
Capitella capitata		1.0	5.0	13.0	0.7	4.7	1.3		0.3

Taxa name	Common Name	HV1	HV2	HV3	LV1	LV2	LV3	HU	LU
Heteromastus filiformis			0.3	10.3		1.7			
Maldanidae	Bamboo worm							0.3	
Armandia maculata						2.0			
Scalibregmatidae	Polychaete worm	11.7		0.3	2.3		12.0		
Polynoidae	Scale worms			0.3					
Exogoninae					14.3	0.3	6.0		0.3
Para-syllid			1.3						
Nereididae				0.3		0.3	0.7		
Perinereis sp.		0.3				0.3			
Glyceridae		1.7	2.0	1.3	1.3	7.7	0.7		
Dorvilleidae						1.0			
Owenia petersenae	Polychaete worm	0.7	4.3	16.3	0.3	38.3	0.3		
Acrocirridae				0.3		0.3	0.3		
Spirobranchus cariniferus	Fan worm			0.3					
Cirolanidae		0.3							
Isocladus sp.	Isopod						0.3		
Corophiidae	Amphipod (family)				0.3				
Lysianassidae	Amphipods					0.7			
Phoxocephalidae	Amphipod (family)	0.7	13.3	6.3		7.0	1.7	0.3	
Amphipoda	Amphipods					1.3			0.3
Austrohelice crassa	Tunnelling mud crab	0.3	0.3	0.3		1.0			
Halicarcinus sp.	Pill-box crab					0.7			0.3
Halicarcinus whitei	Pill-box crab	3.0		0.7	1.0		1.7	0.3	1.0
Hemigrapsus crenulatus	Hairy-handed crab; mud crab	0.3				0.3	0.3		
Hemiplax hirtipes	Stalk-eyed mud crab				0.3				0.3
Brachyura				0.3			0.7		0.7
Ostracoda	Ostracod	0.7	0.3	1.7	0.3	3.3	1.0		
Copepoda	Copepods						0.3		
Elminius modestus	Estuarine barnacle		0.7						1.3
Diptera									0.3
Phoronida	Horseshoe worm			0.3					
Asteroidea	Sea stars			0.3		0.3			
Patiriella regularis	Cushion star					1.7			
	Total average infauna abundance per core (± 1 SE)	131.0 ± 9.8	67.7 ± 6.3	206.7 ± 92.9	99.0 ± 32.0	253.3 ± 50.0	157.7 ± 25.6	31.3 ± 5.7	77.0 ± 10.0
	Total average no. infauna taxa per core (± 1 SE)	18.0 ± 0.6	15.3 ± 1.9	23.0 ± 2.1	15.7 ± 0.9	24.0 ± 4.5	22.0 ± 1.5	6.0 ± 1.0	10.0 ± 1.5

Appendix 8. One-way SIMPER analysis of infauna communities at the vegetated low shore (V) and unvegetated midshore (U) survey sites subject to low (L) and high (H) vehicle usage in Delaware Inlet.

Vegetated (low shore) sites

Low vehicle usage

Average similarity: 49.24

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Prionospio aucklandica	5.88	9.26	2.52	18.80	18.80
Austrovenus stutchburyi	3.68	6.50	4.36	13.19	32.00
Capitellidae (other)	3.27	4.43	1.36	9.01	41.01
Arthritica bifurca	3.29	4.03	0.82	8.18	49.19
Micrelenchus huttoni	2.17	3.06	0.96	6.22	55.41
Macomona liliana	1.73	2.27	0.87	4.61	60.02
Paraonidae	1.47	2.20	1.55	4.47	64.49
Exogoninae	1.92	2.08	1.02	4.23	68.72
Linucula hartvigiana	1.03	1.46	1.07	2.97	71.69

High vehicle usage

Average similarity: 45.20

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Prionospio aucklandica	5.20	8.72	2.46	19.30	19.30
Austrovenus stutchburyi	3.76	7.04	1.45	15.58	34.88
Capitella capitata	2.15	3.45	1.26	7.63	42.51
Glyceridae	1.27	2.89	4.04	6.40	48.92
Owenia petersenae	2.10	2.82	1.08	6.23	55.15
Phoxocephalidae	2.02	2.58	0.72	5.71	60.85
Macomona liliana	1.45	2.38	1.12	5.28	66.13
Notoacmea sp.	1.32	1.99	1.11	4.39	70.52

Unvegetated (midshore) sites

Low vehicle usage

Average similarity: 51.33

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Austrovenus stutchburyi	7.64	35.43	10.99	69.02	69.02
Arthritica bifurca	2.41	10.73	9.50	20.91	89.93

High vehicle usage

Average similarity: 68.97

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Austrovenus stutchburyi	4.64	36.89	8.63	53.48	53.48
Prionospio sp.	1.75	11.89	2.66	17.24	70.72

Attachment 1

tasman district council | Te Kaunihera o te tai o Aorere

Nelson City Council te kaunihera o whakatū

Review of the Operational Plan for the Tasman-Nelson Regional Pest Management Strategy

2018-2019

A2288852

A2288852

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Introduction

This report covers operations under the Tasman-Nelson Regional Pest Management Strategy (the Strategy) between 1 July 2018 and 30 June 2019. As at 1 July 2019 the Strategy ceased to have effect and was replaced by the Tasman Nelson Regional Pest Management Plan 2019 -2029 and therefore this is the final report under the previous Strategy.

Section 100 B(2(a)) of the Biosecurity Act 1993 requires the Management Agency for every pest management strategy to review the Operational Plan annually and report on the Operational Plan and its implementation within five months after the end of the financial year.

The Operational Plan 2018 – 2019 lists the main activities required by the Strategy. The following report by Tasman District Council, in its capacity as the Management Agency, assesses each of these activities and comments on relevant issues.

Purpose

The purpose of the Review of the Operational Plan is to document the implementation of the Strategy over the previous financial year and allow stakeholders to examine the performance of the Council as the Management Agency for the Strategy.

Linkages

This Review of the Operational Plan should be read in conjunction with the Tasman-Nelson Regional Pest Management Strategy 2012 - 2017. It is integrated, as much as possible, with the Tasman District Council's current Annual Plan Report and the 2018-2029 Long Term Plan.

A number of biosecurity activities are also undertaken throughout the Tasman District and Nelson City Council areas by central government agencies (usually the Ministry for Primary Industries – Biosecurity New Zealand) and by industry led organisations. Examples of current MPI lead response include Mycoplasma bovis and Myrtle rust. Examples by industry are wilding kiwifruit vine eradication by Kiwifruit Vine Health and Bovine TB vector control by OSPRI.

The aim for the Mycoplasma bovis response is eradication from New Zealand. At the time of writing it is understood that four cattle herds have tested positive to M bovis in the Tasman District and have been responded to with no properties currently under active control.

The aim for Myrtle rust response is transition from active response to long term management. Myrtle rust can be spread long distances by the wind and there have been an increasing number of Myrtle rust finds throughout New Zealand despite control efforts. There have been a growing number of finds across the Top of the South Island from Marlborough to Golden Bay and a recent find on the West Coast. Seed banking to protect genetic diversity is currently approximately 66% complete. This years (2019) budget does not include any further Government Funding for Myrtle rust and therefore the future of the programme is uncertain.

Bovine tuberculosis feral vector is implemented through the National Pest Management Strategy for Bovine Tb, where OSPRI (previously the Animal Health Board) is responsible for the preparation of an Operational Plan and for reporting on the implementation of the TB Free programme. There are currently no Bovine Tb reactor herds within the Tasman-Nelson area and currently no aerial vector control work being undertaken. Ground control is now complete but survey activity was still undertaken along the foothills from Marahau to Nelson Lakes over the past year.

Control of wilding kiwifruit vines is undertaken by Kiwifruit Vine health for the purpose of controlling Pseudomonas syringae pv. actinidiae (Psa) which is a bacteria that can result in the death of kiwifruit vines. Unmanaged wildings of kiwifruit vines can harbor Psa which can then potentially spread to commercial Kiwifruit vines. Wilding kiwifruit vines are spread throughout the Tasman Nelson area.

Note: Wild kiwifruit are now also declared pests in the new Tasman- Nelson Regional Pest Management Plan 2019-2029.

Management Regimes - Declared Pests

The Regional Pest Management Strategy (now superseded) contains 62 pests (declared" pests) which cause, or are capable of causing, significant damage to the Tasman-Nelson region's environment or its primary industries.

The Strategy groups the individual pests into five categories, with varying levels of intervention by Council. In most situations, the land occupier is responsible for meeting the standards and rules for each pest. Biosecurity Officers work closely with occupiers in the management of Total Control Pests where it is more efficient to simply remove isolated pests than it is to inform a landowner of the work which needs to be undertaken and then to undertake a follow up inspection to ensure it has been done to the required standard.

As the Management Agency, Tasman District Council is responsible for ensuring that occupiers comply with their obligations, that surveillance is carried out to identify and record new infestations of pests, and land occupiers are advised of the most appropriate methods of control for each pest.

Note: All pests listed in the Strategy are banned from sale, propagation, breeding, distribution and commercial display.

1. Total Control Pests

2018-2019 Operational Plan Budgeted Project Cost
$36,800

Actual Project Cost
$50960

Total Control Pests refer to high-risk pests that are of limited distribution or density in the region for which the long-term goal is eradication. There are thirteen pest plants; eight are terrestrial and five are aquatic.

Pests

African feather grass	Bathurst bur
Boxthorn	Cathedral bells
Climbing spindleberry	Egeria
Entire marshwort	Hornwort
Madeira vine	Phragmites
Saffron thistle	Senegal tea
Spartina	

Strategy Objective

Eradication of these pests from the Tasman-Nelson region by 2022.

2018-2019 Objectives

1. Investigate all reports of new infestations to confirm identification and undertake surveillance of adjoining areas within twenty working days of being reported.
2. Inspect all sites that are classified as **New**, **Active** or **Monitoring**, on an annual basis and work with the occupier to destroy all live material.
3. Inspect all sites regularly that are classified as **Historic** to confirm their status. This will vary from annual to five-yearly inspections, depending on the biological characteristics of the pests and when it was classified as historic.
4. Record all sites containing Total Control pests on the database and actions taken.
5. Update the classification of all properties using the modified Holloran classification by 31 July.

Achievements

General

1. All new sites were inspected within twenty working days of being reported.
2. All new, active and monitoring sites of Total Control Plant Pests (african feather grass, bathurst bur, boxthorn, cathedral bells, climbing spindleberry, egeria, entire marshwort, hornwort, madeira vine, phragmites, saffron thistle, senegal tea and spartina) were inspected during the year.

3 Department of Conservation have taken on a lead role in controlling spartina, in both Tasman and Nelson with ongoing control work within the Waimea Inlet.

4 All live plants found were destroyed, and/or control programmes initiated and plant numbers reduced.

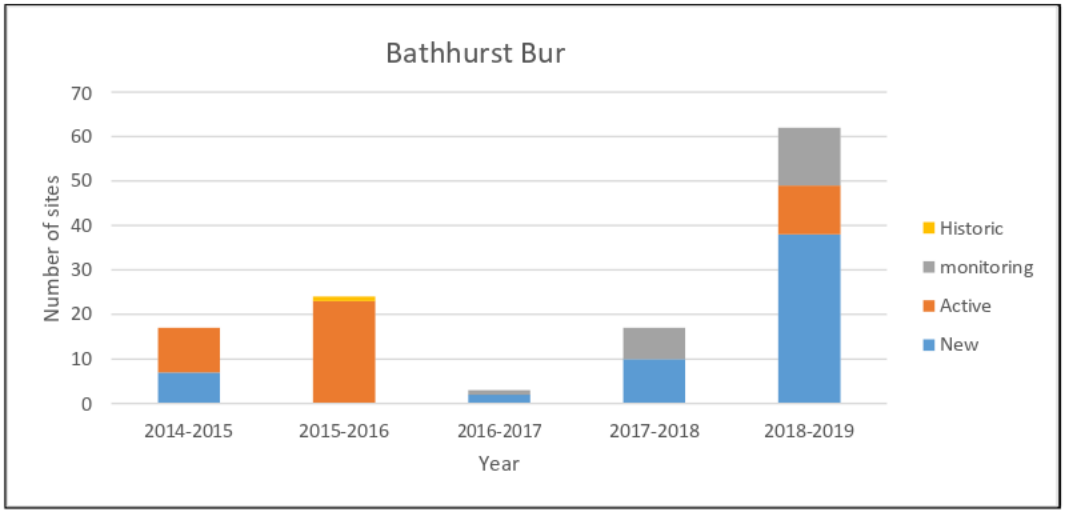
5. Information recorded at each site was downloaded into the pest database for storage and analysis.
6. Historical sites where live plants have been absent for several years continue to be inspected at intervals ranging from two to five years, depending on their biological characteristics. There are no inspections of hornwort and senegal tea sites as these two species have been eradicated.

7 This year saw significantly increased effort on bathurst bur as a result of major land development in Richmond West disturbing viable seed in a known site and causing it

5

to germinate. The land development also resulted in soil potentially contaminated

with bathurst bur seed being moved and needing to be contained in stockpiles on site and managed into the future. Expert advice has been sought from Ag Research in this regard.



8 Changes to the pest data field collection devices and replacement of the pest database system means the Holloran classification system is no longer able to be used to track progress on particular pest species. New time series analysis tools are being developed to work with the new database but are not ready for this annual report. An example of trial output is given above for Bathurst bur.

2. Progressive Control Pests

2018 - 2019 Operational Plan Budgeted Project Cost
$77,300

Actual Project Cost
$83,300

Progressive Control Pests are pests whose distribution is limited to parts of the region but in the absence of more effective methods of control, they are unlikely to be eradicated because of their biological characteristics e.g. long-term seed viability. There are eighteen pests - twelve plants, five fish and one bird (rooks).

Pests	
Banana passion vine (Golden Bay)	Boneseed (outside the Port Hills)
Chinese pennisetum	Climbing asparagus (eastern Golden Bay)
Gambusia	Koi carp
Nassella tussock	Old man's beard (Golden Bay to Kaiteriteri, Upper Buller Catchment)
Perch	Purple loosestrife
Reed canary grass	Reed sweet grass
Rooks	Rudd
Tench	Variegated thistle

White-edged nightshade	Wild ginger (Golden Bay to Kaiteriteri)

Strategy Objective

Reduce the distribution and density of Progressive Control Pests in the Tasman-Nelson region over the term of the Strategy.

2019-2019 Objectives

1. Investigate all reports of new infestations to confirm identification and undertake surveillance of adjoining land within forty working days of being reported.
2. Inspect all sites that are classified as **New**, **Active** or **Monitoring** on an annual basis and advise the occupier of any action that is required.
3. Record all sites and the actions to be taken on the pest database.
4. Update the classification of all properties using the modified Holloran classification by 31 July where this is feasible and meaningful.
5. The Department of Conservation will inspect all properties with known or suspected infestations of pest fish, undertake control, and report to the Council by 15 August on the outcome using the modified Holloran classification.

Achievements

General

1. All reports of new infestations were investigated within thirty days of being reported.
2. All sites classified as New, Active and Monitoring sites were inspected and occupiers advised of the required actions.
3. All sites were recorded on the pest database, along with the appropriate notes.
4. The distribution and density of Progressive Control Pests have been reduced at most sites. Concerted action is being undertaken by community groups at sites in eastern Golden Bay against the more widely distributed weeds such as banana passion vine and old man's beard and by numerous community groups elsewhere on sites with significant natural values. Climbing asparagus, once a popular plant with florists, is a highly invasive vine that has become established and spread through lower sections of the hill country in eastern Golden Bay. A community group (Project DeVine Trust) has risen to the challenge of dealing with this and other pest plants on this steep difficult terrain and it successfully bid for funding from a range of sources to support control. Biosecurity staff are working closely with the group.

4 LINZ have contracted this group to control old man's beard and banana passionfruit particularly in Crown Land riverbed areas.

3. Containment Pests

Containment pests are pests that are abundant in the region. There are fourteen pests - four plants (purple pampas, lagarosiphon, and gorse and broom in the Howard-St Arnaud area), seven mammals (feral cats, rabbits, hares, possums, mustelids), two insects (ants) and one bird (magpies).

2018 - 2019 Operational Plan Budgeted Project Cost
$84,800

Actual Project Cost
$91,000

Pests	
Argentine ants	Australian magpies
Broom (Howard-St Arnaud)	Brushtail possum
Darwin's ants	Feral cats
Feral rabbits and Hares	Gorse (Howard-St Arnaud)
Lagarosiphon	Mustelids (Stoats, Weasels and Ferrets)
Purple pampas	

Strategy Objective

To prevent the spread of Containment Pests to adjoining properties or to parts of Tasman and Nelson that are not currently infested.

2018-2019 Objectives

1. Destroy isolated infestations and reduce incidence at other sites.
2. Provide information and advice to occupiers on methods of control.
3. Undertake surveillance for lagarosiphon and purple pampas and ensure occupiers comply with Strategy rules.
4. Encourage the development of new tools and techniques to control argentine and darwin's ants to slow their rate of spread within urban areas and make this information available to the occupier of infested properties.
5. Monitor changes in pest ant distribution and encourage the adoption of effective products and techniques for controlling pest ants by occupiers.
6. Respond to requests for help with animal/bird pest control within ten working days
7. Lend traps to occupiers on a short-term basis to control magpies, brushtail possums, mustelids, and feral cats, and provide advice on the control of feral rabbits and hares.

Achievements

1. Continued to identify isolated infestations and advise occupiers on methods of treatment.
2. Continued to provide information and advice on methods of control.
3. As purple pampas was being dropped from the new RPMP (we lost) only limited activity was undertaken for this species during 2018-2019.
4. Significant work undertaken in the Howard-St Arnaud gorse and broom control area maintaining the integrity of the control area boundaries and spreading biological control agents.

5. Continued to monitor changes in the distribution of argentine and darwin's ants, and provide information for owners and occupiers wishing to undertake control. No specific monitoring was undertaken however 4 new sites were found from ant samples submitted, 3 in Nelson. Five areas of ant range expansion were also noted in NCC from samples submitted or from field observations.
6. Advice and research was commissioned from Richard Toft regarding management of Argentine ants on Bells Island and this advice was conveyed to the Regional Sewerage Business unit.
7. Continued to respond to requests for help with animal/bird pest control within ten working days. A new supply of traps was purchased and a trap loan database developed to better manage this activity (and to get loan traps back).

Discussion

A significant effort has gone into preventing the spread of Containment Pests. Effective control of pest species is dependent on the coordinated actions of many occupiers. There are many community groups operating on public and private land who are controlling predators and browsers to protect rare and endangered native species. There is very good cooperation between the Department of Conservation and OSPRI (previously the Animal Health Board) around Kahurangi National Park and this is providing significant economic and biodiversity benefits. Data is being collected from areas where pests are being effectively controlled and monitoring is being undertaken (e.g. Rotoiti Mainland Island (Department of Conservation and Friends of Rotoiti), Kahurangi Tablelands (Friends of Flora), the Cobb Valley (Friends of the Cobb) and the Brook Sanctuary (Brook Waimarama Trust) Various trapping groups including Marsden Valley and Richmond Hills. The results show substantial increases in control effort and the diversity and density of many species of native birds.

Project Janszoon (funded by Next foundation) have been controlling a wide range of plant and animal pest species within Abel Tasman National Park with the objective of ridding the park of these pest species. This work is being complimented by Abel Tasman Birdsong Trust (funded by Abel Tasman National Park tourism operators) who are undertaking complimentary pest control both within the park and along its boundaries.

The two species of pest ants (argentine and darwin's) are continuing to spread slowly, as is purple pampas. Considerable effort is being put into the control of gorse and broom in the Howard-St Arnaud area and while there is generally good landowner support plant densities along the western boundary of the control area are increasing.

Comments on Individual Pests

1. <u>Gorse and Broom in the Howard-St Arnaud control area</u>
   Staff are fighting a pitched battle to maintain the boundary integrity of the control area through traditional control methods (grubbing, spraying). LINZ has contracted the Department of Conservation to control gorse and broom on unoccupied crown land. However the best news is that Broom gall mite, a biological control agent released in the area has established and is naturally spreading through. The Broom gall mite is having a significant impact on broom vitality and hence density and seed production (see photos below). The establishment of bio control agents is helping reduce the boundary pressure on the control area by reducing the viability of the broom outside the control area and along the control area boundaries. It should be noted that this

was an unusually dry year which may have contributed to the effectiveness of broom biological control agents.

2 Argentine and Darwin's Ants

The ongoing inability to control the spread of argentine and darwin's ants has resulted in these pests being dropped from the new Regional Pest Management Plan. While no control work was undertaken during the 2018-2019 year the provision of education and advice continued. Each year information is made available to occupiers of properties containing invasive ants to assist them with control. As the number of infested properties continue to increase it has become more efficient to provide this information via Council publications and web sites rather than mail outs to individual properties.

A number of occupiers are using residual insecticides to control ants. X-it Ant spray is a contact insecticide with a residual life of around 2 months. Biforce granules also contain a contact insecticide that can be used on lawns, gardens, barked areas and shrubbery. There is concern about the impact of widespread use of contact insecticides on other invertebrates (e.g. worms) that are important for natural processes. Council has discontinued the use of a contractor to spray X-it Ant on the edge of foot paths as it became less effective over time.

Vanquish Pro ant bait (previously called Xstinguish bait) provides a targeted approach to ants as it is designed to be attractive to ants but not to other invertebrates and the quantity of toxin used on individual properties is very low. To provide ongoing control, there is a need to protect the property from reinvasion from adjoining properties that have not been treated and X-it ant spray and Biforce granules can provide this for a period of time. Two repeat treatments at two-monthly intervals may be needed between November and March to maintain its effectiveness.

3. Australian Magpie

Biosecurity officers continue to meet the seasonal demand in rural areas for traps and call birds to reduce magpie numbers. Golden Bay occasionally has magpies arriving in the Takaka Valley via Riwaka. During this period, six birds were controlled in the Takaka, Rameka and Little Sydney Valley areas. The new Regional Pest Management Plan seeks to exclude magpies from Golden Bay. However in the Nelson City area magpie continue to establish with 15 birds being trapped on Pepin Island.

4. Brushtail Possum/Mustelids/Cats/Rabbits/Hares

There is a continuing demand for traps and requests for advice on control. The Biosecurity Officers provide a very good service to occupiers.

5 Trapping Success

A record of loan trap kill rates has been established in order to measure both trapping and locational results as part of a wider monitoring programme. Tasman District Council sponsors the Tasman Nelson Conservation Volunteers Newsletter through which many of the volunteer groups share information and report their activities including trapping and planting activity.

You can receive copies of the newsletter by following the link below.

https://tet.us20.list-manage.com/subscribe?u=d4be32e8b40383138ae4035d4&id=a3b24c0595

6 Purple Pampas

Plants continued to be found and destroyed where they were outliers to major infestation areas however the plants are so numerous in the core infestation areas that this species is not included in the New Regional Pest Management Plan. This plant produces prolific quantities of seed that can travel considerable distances downwind and the existence of large areas of suitable habitat (e.g. scrubland) make it impossible to stop its spread. Only effective biocontrol agents can provide long-term control on a landscape level, but no suitable candidates have yet been identified.

4. Boundary Control Pests

2018-2019 Operational Plan Budgeted Project Cost
$13,000

Actual Project Cost
$13,500

Boundary Control Pests are eight pest plants (mostly common weeds such as blackberry, gorse and broom) and five horticultural diseases (on apples and pears) that are widely distributed.

Pest	Distance from boundary
Australian sedge	20 metres
Blackberry	10 metres
Black spot, Codling moth, Powdery mildew	500 metres from pipfruit orchard
Broom (outside Howard-St Arnaud)	10 metres
Buddleia	50 metres
European canker	30 metres
Fireblight	500 metres from pipfruit orchard
Giant buttercup	5 metres
Gorse (outside Howard-St Arnaud)	10 metres
Nodding thistle	20 metres
Ragwort	20 metres

Strategy Objective

To control the spread of Boundary Control Pests from adjacent properties or road reserve to land that is clear, or being cleared, of these pests.

2018-2019 Objectives

To intervene in response to any reasonable complaint of non-compliance by an adjoining land occupier.

2017-2018 Performance Indicators

1. Follow up all complaints regarding a nominated boundary pest/s within ten working days.
2. Advise the complainant if the complaint meets the requirements of the strategy and of the action to be taken following the inspection within five working days.

Achievements

1. The subdivision of rural land for residential properties has resulted in numerous requests for council intervention. Biosecurity Officers have dealt promptly with the issues raised by these requests. Providing detailed specifications for gorse, broom and blackberry has allowed most occupiers to resolve boundary issues without further staff involvement. Others have required some staff involvement to achieve resolution. Two Notices of Direction were issued with one in the Nelson area being defaulted on by the absentee owner. As a result the Management Agency arranged to have the necessary work undertaken and the cost was invoiced to the landowner.

5. Regional Surveillance and General Surveillance

2018 – 2019 Operational Plan Budgeted Project Cost
$70,000

Actual Project Cost
$78,300

Regional Surveillance Pests are four pest plants that could pose a future risk but there has been limited information on their present distribution. These are being monitored and advice is provided to occupiers to encourage voluntary control. General surveillance involves work that is undertaken to identify new pests and changes in the distribution of existing pests along with work associated with supporting national responses or local community initiatives.

Strategy Objective

To assess the distribution and monitor the spread and impact of Regional Surveillance Pests.

2018-2019 Objectives

To continue assessment of the distribution and monitor the spread and impact of Regional Surveillance Pests.

2017-2018 Performance Indicators

Map the distribution of Regional Surveillance Pests and review the literature to allow an assessment of the level of risk posed by these pests and the methods and costs of treatment.

Achievements

1. Surveillance has identified sites of yellow flag, parrot's feather and *Pinus contorta.* There has been no formal surveillance of *undaria,* but it is regularly recorded in the port surveys undertaken for the Ministry for Primary Industries. Anecdotal information indicates that it is present in low densities throughout the district.
2. There is ongoing discussion between DOC, Nelson Forests Ltd and LINZ on the implementation of the recommendations in a report on wilding conifers in Mt Richmond Forest Park by Nick Ledgard. A Mt Richmond Forest Park Wilding Conifer Control Strategy is complete with DOC as the lead agency. A formal bid was made to MPI to fund extensive control work through the National Wilding Conifer Control Programme however Government funding was only a fraction of the amount sort and as a result only existing programmes continued to receive funding. Other funding avenues are currently being explored (M Hippolite pers com, DOC).
3. The following plants, although not on the Regional surveillance list, have been recorded on our point data system to provide data on future imminent threats. These include; akebia, darwins barberry, Gunnera *tinctoria*, horsetail, yellow jasmine, kiwifruit wildings, lantana, pink ragwort, sweet pea shrub, yellow bristle grass, asian knotweed, and climbing asparagus. Many of these pest plants are now contained within the Regional Pest Management Plan which came into force on July 1st 2019.

6. Pest Control in Sites of High Public Value

2018 – 2019 Operational Plan Budgeted Project Cost
$10,000

Actual Project Cost
$3,500

Strategy Objective

To control nominated pests on land designated as high public value sites.

2017-2018 Objectives

1. Undertake pest control programmes at following sites in Tasman District:
2. Liaise with the Native Habitats Tasman Operations team to identify high value sites and work with owners on developing effective pest management programmes.
3. Undertake pest control programmes at sites in Nelson City selected by NCC's Parks and Reserves staff.
4. Provide information and advice to individuals and community groups managing pests on high-value sites.

2018-2019 Performance Indicators

1 Undertake pest control programmes at following sites in Tasman District:

- Lee Valley Reserve.
- Coastal margins from Marahau to Riwaka.
- Other sites as recommended by biosecurity and Parks and Reserves staff.

2 Liaise with the Native Habitats Tasman Operations team to identify high value sites and work with owners on developing effective pest management programmes.

3 Undertake pest control programmes at sites in Nelson City selected by Nelson City Council's Parks and Reserves staff.

4 Provide information and advice to individuals and community groups managing pests on high-value sites.

Achievements

1. Lee Valley Reserve

   Old man's beard and barberry seedlings continue to be controlled by cutting and stem swapping, grubbing or hand removal (work is ongoing).

2 Sites of high significance (Nelson City)

   As privet is a significant pest species within many parts of the Nelson City area and no specific site had been agreed to, the year funding allocation for site lead work was allocated towards assisting the release of a biological control agents undertook a double release of Privet lace bugs along the Railway Reserve in the Nelson City area.

3 Printed guides, loan traps and other advice has been provided to community groups (including those operating on public land) to assist their effectiveness.

4. Community Groups

   Pest control work is being undertaken by a substantial number of community groups in the Tasman-Nelson regions in sites with high biodiversity values and in areas close to suburbs. There are more than 50 groups known to be controlling, pests and weeds. These include; the Brook Waimarama Sanctuary, Project Janszoon, Abel Tasman Birdsong Trust, Friends of Flora, Friends of Rotoiti, Friends of the Cobb, Friends of Mangarakau Swamp, Onekaka Biodiversity Group, Birdlife on the Grampians Trapping Group, Marsden Valley Trapping Group , and Richmond Hills Trapping Group, Nelson Centre of NZ Trapping Group, Milnethorpe Park, Parapara Trapping Group, Onehau estuary, Soper Rototai, Motupipi Hill, Friends of Paynes' Ford, Project Rameka, Otuwhero Wetlands, Kanuka Ridge trapping, Motueka OSNZ, Mapua Wetland, Dominion Flat Trapping, Battle for the Banded Rail, Kaiteriteri Bike Park, Pearl Creek, Rabbit Island Trapping, Haven Holes, Titoki Reserve, Boulder Bank, Sad Flats Trapping, Paramata Flats (F&B), Bishops Peninsula, Pepin Island Trapping, Six Mile trapping, and the Lake Rotoroa Care Group.

   There are also a number of groups specifically controlling plant pests. The Tasman/Nelson Weedbusters are controlling vines in high value indigenous forest sites throughout the Moutere. Project De-Vine under the leadership of Chris Rowse has been working with landowners on rugged hill country between Motupipi and Port Ligar and has now expanded onto the Takaka Hill and Riwaka Valley, Marahau and Lower Motueka River areas where volunteer groups have established to undertake

pest vine. Local volunteer Ian Price has been spraying pest plants in the undergrowth at Pearl Creek. Pest plants were mainly tall fescue, willow and blackberry.

7. Biological Control

2018 – 2019 Operational Plan Budgeted Project Cost
$30,000

Actual Project Cost
Staff time $13,000
National Biological Control Collective Contribution $21,000
Total costs $34,000

2018-2019 Objectives

1 Support ongoing research into biological control through the Regional Councils' Biocontrol Collective and provide input into the development of the annual research programme.

2 Identify priorities for local release of biocontrol agents and arrange to purchase and distribute to suitable sites in Nelson and Tasman.

3 Inspect sites where biocontrol agents have been recently released and monitor progress.

4 Distribute established biocontrol agents into new pest sites, provide information and advice to land occupiers, record details in the pest database and advise Landcare Research of new release locations.

5 Identify training needs and make use of training opportunities.

Achievements

1. The Council continues to support the research programme of the Biocontrol Collaborative through its financial contribution and its participation in the development of the research programme.

2. Bridal creeper rust is a naturally introduced biocontrol agent that arrived from Australia. It continues to impact on infected plants, killing new growth and reducing seed production.

3. Biocontrol agents have been collected from local sites once they have successfully established and released into new sites. Recent releases include Scotch thistle gall fly and the Buddleia weevil. Buddleia weevil has also been expanding rapidly from its initial release sites and is impacting on buddleia in the adjoining areas .Broom gall mites have now colonised broom plants from the Wangamoa's through the Richmond Hills and through the Waimea Basin and Motueka Valley areas. A significant impact on the health of broom plants in these areas have been observed. Scotch thistle gall flies have been released at Station Creek, Speargrass Station, Lamb Valley, Creighton Road, Shenandoah Valley, Thorpe and Golden Bay.

4. Biosecurity staff continue to monitor biocontrol agents.
   - Bridal creeper rust arrived here from Australia and has been killing most of the new growth and reducing seed production.
   - Broom gall mite. Mites are being harvested from established areas and released in new areas including Murchison, Nelson Lakes and Golden Bay.
   - Broom leaf beetle. This is slowly establishing at the release sites on Rough Island.
   - Broom psyllid. Was observed to be widespread thru out both Nelson and Tasman areas with noticeable impacts observed. However in Golden Bay there is not record of establishment.
   - Broom seed beetle. This has successfully established and is now widely distributed throughout the district.
   - Gorse soft shoot moth. . Is now widespread throughout Nelson and the Waimea hinterland to beyond the Tapawera area.
   - Nodding thistle crown weevil. This has eventually established at some of its release sites but has been very slow to spread. It remained undetected on one release site for nearly 30 years and was only recently located during a routine inspection. It is now being harvested from the well-established sites and released into new locations. It has established well in the 88 Valley area.
   - Nodding thistle gall fly. This is now well established through the main areas of nodding thistle infestation. This, along with the crown weevil and the receptacle weevil, has been very effective in reducing nodding thistle infestation.
   - Green thistle beetle. Establishment of this beetle released at Matariki to control Californian thistle is being monitored.
   - Portuguese gorse thrips. This is well established throughout the region.
   - Ragwort plume moth. This has been slow to establish at release sites in the Howard Valley, Rappahanock Valley, near Maruia and near Collingwood.
   - Scotch thistle gall fly is widespread throughout the Regions and will lead to a significant decrease in this weeds abundance in the future.
   - Tradescantia agents. Tradescantia leaf beetle was released at a site on the edge of Poorman's Valley Stream and Tradescantia stem beetle was released onto a site on the Tahunanui Hillside. Both of these beetles were released at a site adjacent to Fairfield House in Nelson along with the Tradescantia tip beetle. The releases at Fairfield House has now reduced the biomass of tradescantia significantly so that bare ground is now visible. Prior to the release there was a carpet cover of Tradescantia to a depth of around 250 mm.
   - Tradescantia yellow spot leaf fungus infected plants were placed in the NCC Murphy Street Reserve in April this year.
   - Woolly nightshade lacebugs were released at two sites near Richmond but extensive searches have failed to locate any survivors. Results in other regions now indicate that it is only effective where the plants are shaded. A further release has now been made using lacebugs sourced from the Bay of Plenty. It appears this release has established.

7. Sixteen plant samples were sent to Landcare Research to confirm identification.

8. Under its contract with the Regional Councils Biocontrol Collective, Landcare Research continues to develop biocontrols for the pest plants in the programme and investigate methods to maximise the effectiveness of biological control techniques. This Council is involved with other regional councils in the annual review of the Biocontrol Collective research programme.

9. The National Collective of regional councils gained EPA consent to release a new strain of Rabbit haemorrhagic disease virus (RHDV1 K5) for the control of feral rabbits during 2017-2018 year to refresh the effectiveness of this biological control agent against feral rabbits. This release appears to have coincided with a natural pulse of the older agents released in 1997 and was only of limited additional effect. A further release of the K5 agent occurred at three sites in Tasman District during the 2018-2019 year with slightly better but still limited effect.

8. National Pest Plant Accord

2018 – 2019 Operational Plan Budgeted Project Cost
$1,500

Actual Project Cost
Total costs $750

Strategy Objective

1. To prevent the sale, propagation or distribution within New Zealand of any pest plant determined as an unwanted organism under the Biosecurity Act 1993.

2018-2019 Performance Indicators

1. Ensure all plant outlets have a current copy of the New Zealand Pest Plant Manual of National Surveillance Plants, which lists the plants that are banned from sale, propagation and distribution.
2. Inspect nurseries and other plant outlets during the term of this Strategy for plants identified on the National Pest Plant Accord. Outlets with NPPA plants and outlets which raise the concern of biosecurity officers will be inspected annually until these concerns are satisfied.

Achievements

New nurseries and plant retailers were inspected as required to ensure that no plants listed on the National Pest Plant Accord were being sold.
Over the last two years there has been limited national activity occurring with the NPPA and therefore regional activity has been limited to following up previous work.

9. Provision of Education and Advice

2018 - 2019 Operational Plan Budgeted Project Cost
$75,000

Actual Project Cost
$62,300

2017-2018 Objectives

1. Provide information and advice to aid identification and control of pests.
2. Provide a biosecurity display in a suitable forum if the opportunity arises.
3. Provide pest control workshops when requested to assist individuals and groups to carry out efficient and effective pest control.
4. Provide media releases on pests, - their control and on other areas of biosecurity interest.
5. Provide field knowledge and support to research and industry groups in their endeavours to resolve biosecurity issues.

2018-2019 Performance Indicators

1 Prepare new and update existing publications to aid identification and control of pest plants and animals.

2 Provide Newsline with nine "Pest of the Month" articles.

3 Provide advice on identification and control of pest plants and animals/insects within 5 working days of a request.

4 Attend at least three public environmental events and provide educational material and associated advice on regional biosecurity.

Achievements

1. Media articles and information pamphlets on argentine and darwin's ants were made available to the general public and the council website information updated.
2. Three brochures on Controlling Scrub Invaders, Controlling Pest Trees and Controlling Vine Invaders were updated. A further brochure on controlling vertebrate pests is in preparation. Website information was updated.
3. Biosecurity Officers responded to 404 public enquiries through the council's service request system (compared to 430 the year before) Requests were evenly spread between pest plants and pest animals. Enquiries included requests for assistance with the identification and control of animal, plant and insect pests.
4. Biosecurity officers have provided advice and lent traps to occupiers to control possums, feral cats, mustelids, magpies, rabbits and rats.
5. Information packs on the National Pest Plant Accord have continued to be distributed.

10. Top of the South Marine Biosecurity Partnership

2018 – 2019 Operational Plan Budgeted Project Cost
$20,000 (of a total of $80,000)

Actual Project Cost
$25,200

1. The Top of the South Marine Biosecurity Partnership was established in 2009 to reduce the risk from marine pests. It has been funded by the three Top of the South councils and the Ministry for Primary Industries (Now MPI BNZ) with an annual contribution of $20,000 from each of the three councils, $20,000 from Central Government, and an in-kind commitment from the aquaculture industry.
2. The programme is largely delivered through a service contract with Peter Lawless and Associates (Barrie Forrest, Charmayne King and Matt Molloy) who undertake education, advocacy, research, reporting, planning and partnership co-ordination services.
3. The contract has been overseen by a management committee comprising representatives of the funding parties (the three councils, MPI and iwi). Richard Frizzell represents Nelson City Council. Paul Sheldon Tasman District Council and Jono Underwood from Marlborough District Council who acted as Chair and contract administrator for the 2018-2019 year.
4. An extensive summer vessel survey was undertaken by Barrie Forest and Peter Lawless during the summer of 2018/19. It included 521 Vessels and 401 coastal structures (mainly swing moorings and jetties) as well as 47 seabed sites with seventeen days on the water with Top of the South Harbourmasters visiting vessels, inspecting their hulls and seeking travel and maintenance information from their operators. Within Tasman and Nelson Waters 122 vessels and 41 structures (mainly swing moorings) were surveyed. The distribution of the sites surveyed are shown in the Figure 1 below. The data from this work compliments that collected in previous years and comprises a total of 2683 survey records.

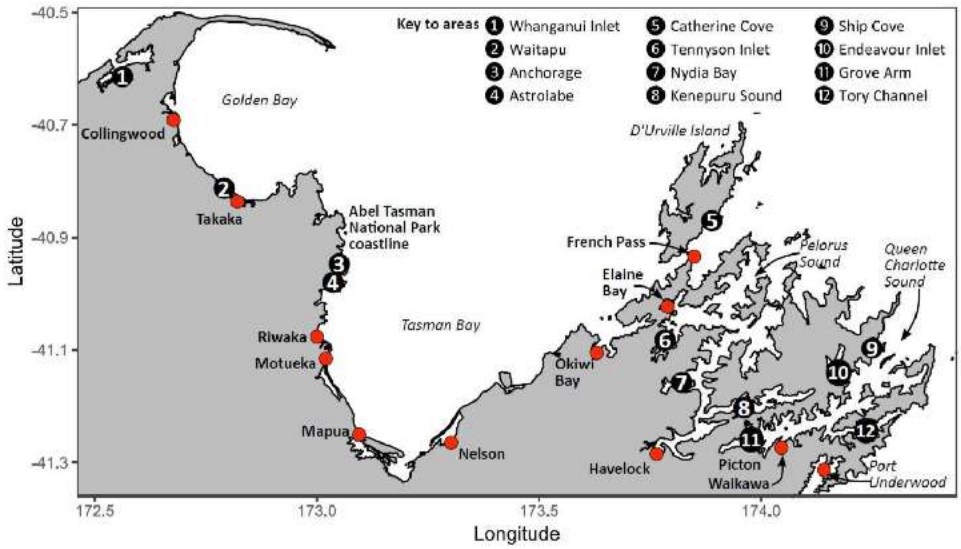


Fig. 1. General region covered during the summer biofouling and marine pest surveys over 2015-2019.

5. The survey identified many conspicuously fouled vessels at risk of transferring marine pests. While there appears to have been an improvement in the cleanliness of vessel hulls within the Marlborough area, the cleanliness of hulls of vessels within the Tasman Nelson area shows no improvement and appears to be getting worse (See figure 2 below). Most vessels surveyed were of local origin with Tasman and Golden Bays with vessel owners citing a lack of suitable maintenance facilities as the reason for the fouled hull.

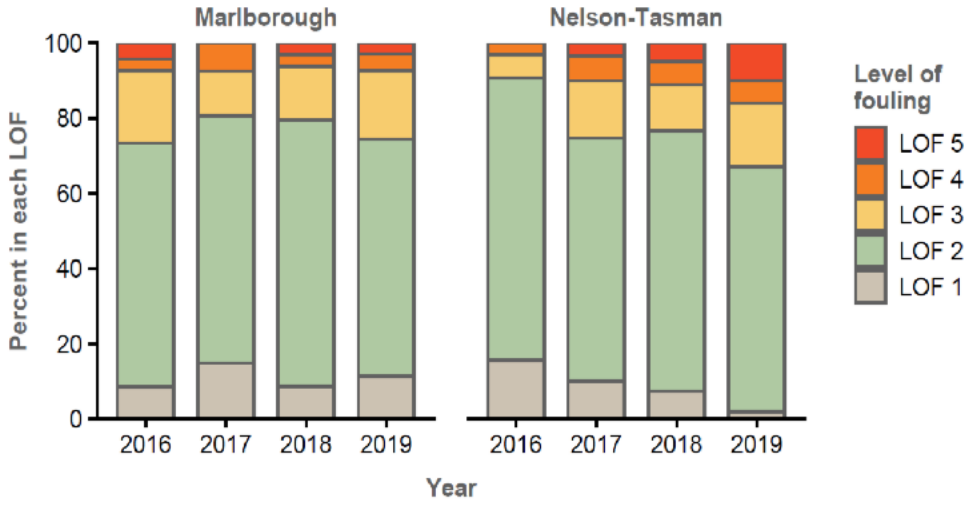


Fig. 2. Proportion of active vessels in each LOF category that were recorded in the two main regions over the four survey years (n = 30-203).

6. The marine pest Sabella *spallanzanii* which is subject to a "Small Scale Management Plan" in each of the three Top of the South Council areas was not detected during the survey work. Sabella is now contained within the RPMP for each council area.

   It was noted that the marine pest Styela *clava* had spread over recent years and was found across the entire Top of the South area.

7. Four Newsletters have been produced and mailed out to stakeholders and supporters with over 200 individuals and organisations with a wider distribution to more than 1,000 individuals. A survey found high levels of satisfaction with the newsletter but readers were keen to see more content on the national scene and on the activities of partners.

8. There continues to be intensive interaction with marine industry groups on a range of issues. These include marine farmers, commercial fishers, recreational fishers, port companies and harbourmasters and marina managers.

9. Changes in the formulation of anifouling paint on the market bought about by review of approvals by the Environmental Protection Agency, have led to some products not being correctly used, applied or maintained. In order to encourage best practice the Partnership along with Altex Paints ran workshops for vessel owners providing advice on choosing, applying and maintaining the right paint for the vessel type and operating profile.

10. The Top of the South Marine Biosecurity Partnership jointly purchased a quarantine "Fab-Dock" for sterilisation of vessels with marine pests of up to 20 metres long. The dock has been fitted with a dedicated trailer units with includes its own generator plant and all materials for deployment. The unit is available for rapid response to

vessels infested with marine pests across the Top of the South area (and further on request).

11. With a National Environmental Standard for Aquaculture being prepared by Central Government there is increasing emphasis on managing marine biosecurity risks. New marine farms need to prepare marine biosecurity plans for their farm. The partnership was been working with the industry and individual farmers to assist their understanding of marine biosecurity risks and to help them prepare effective management plans.

11. Other pests

11.1 Management of Didymo and other aquatic pest plants

In the Tasman-Nelson region, the invasive freshwater algae, didymo (*Didymosphenia geminata),* was first recorded in the Upper Buller River in September 2005. Biosecurity staff worked with MAFBNZ (now MPI BNZ), the Department of Conservation, and Fish & Game New Zealand, to erect and maintain notices, undertake sampling, and provide information and advice to river users. MPI continues to provide the Council with annual funding (up to $20,000) to manage a summer freshwater advocacy programme to slow the spread of established freshwater pests and stop the introduction of new pests. This work is contracted to the Nelson-Marlborough Fish & Game Council, an organisation with a very good knowledge of local waterways and credibility with recreational users. They work with the Department of Conservation staff at the Rotoiti boat shows and the Buller Kayak Festival and promote the recommended Check-Clean-Dry approach for users moving between waterways. They also raise awareness of the Check-Clean–Dry message with the increasing number of tourists visiting the areas lakes and rivers.

Fortunately, didymo's impact in Tasman rivers has been much less than in some southern waterways. This is attributed to fluctuating water levels and intermittent flushing from significant storm events. Unfortunately, it has continued to slowly spread up tributaries and into some new waterways but the campaign has played an important role in slowing its rate of spread and many waterway users are well aware of the need to Check-Clean- Dry before moving into new waterways. The programme has now been expanded to cover a range of freshwater pest plants where an effective means of stopping their spread is to encourage users to Check-Clean-Dry when moving between waterways.

11.2 Notifiable Organisms (Plants)

These high-risk plant pests were originally classified under the Noxious Plants Act 1978 as Class "A" Pest Plants. They include cape tulip, johnson grass, *Salvinia*, water hyacinth and water lettuce. They are now included in the list of National Interest pests (see below). Notifiable Organisms are classified under the Biosecurity Act and are required to be reported if they have not previously been recorded in the region. No new Notifiable Organisms were reported during the last financial year.

11.3 National Interest Pests

The Ministry of Primary Industries has eleven high-risk pests that they are responsible for managing. These are listed in the following table.

Table 1: National Interest Pests Managed by the Ministry for Primary Industries

Common Name	Species	Goal
Salvinia*	*Salvinia molesta*	Eradication
Water hyacinth*	*Eichhornia crassipes*	Eradication
Johnson grass	*Sorghum halepense*	Eradication
One-leaf cape tulip	*Moraea flaccida*	Eradication
Pyp grass	*Ehrharta villosa*	Eradication
Phragmites	*Phragmites australis*	Eradication
Hydrilla*	*Hydrilla verticillata*	Eradication
Hornwort*	*Ceratophyllum demersum*	Eradication in the South Island
White bryony	*Bryonia cretica subsp dioica*	Eradication
Rainbow lorikeet	*Trichoglossus haematodus*	Control to zero density
Manchurian wild rice	*Zizania latifolia*	Eradication of outlier populations

* Aquatic plants

Five National Interest Pests - johnson grass, water hyacinth, salvinia, hornwort and phragmites – have previously been recorded in Tasman District but all have been eradicated from known sites. The Council continues to survey these sites and adjoining areas.

11.4 Wasps

Potential biocontrol for European wasps

Biosecurity staff have been actively involved with assisting wasp related research and control. There are two species of European wasp in New Zealand. The German wasp arrived in the late 1940s and had spread throughout within a decade. It has thrived in beech forests because of the availability of honeydew, produced on the stems of some species of beech by scale insects. It dominates native ecosystems by removing food sources used by native birds (tui, bellbird) and native animals and feeding on native invertebrates for protein. The second species of European wasp, the common wasp, arrived in the 1970s and spread very quickly. It is very similar in appearance and has largely supplanted the German wasp on many sites.

Under the leadership of Landcare Research, a research wasp biocontrol project has been funded through the Sustainable Farming Fund. While previous efforts to find wasp biocontrol agents have been unsuccessful, the discovery of a mite associated with dead and dying German wasp colonies by a PhD student (Bob Brown) has led to renewed research.

While the research into the mites shows promise it appears that by themselves they will not adequately suppress wasp numbers and other types of biocontrol would also be required. The use of DNA analysis techniques has shown that the New Zealand population of both German and common wasps is likely to have been from the United Kingdom while previous biocontrol agents were sourced from other parts of Europe. This

discovery may explain why previous attempts at biocontrol using other parasites did not succeed.

Research effort is now focussed on potential wasp parasites from the wasp's home range (the UK) in the hope that these will prove to be more effective than those previously imported.

Newly arrived species of European paper wasp appear to have established in the area and frequently build nests in homes. Biosecurity staff regularly receive and respond to requests from property owners seeking assistance with paper wasps.

12. Administration, Training and Regional Pest Management Plan

2018 – 2019 Operational Plan Budgeted Project Cost
$154,000

Actual Project Cost
$111,500

The current Regional Pest Management Strategy expired in November 2017. Amendments to the Biosecurity Act 1993 made in 2012 along with the issuing of National Policy Direction for Pest Management in 2015 has meant that the current Strategy has to be rewritten as a Regional Pest Management Plan (RPMP). Both Tasman District Council and Nelson City Council resolved to prepare a joint RPMP and to notify it before November 2017. That notification date was achieved and subsequently a Joint Committee of Nelson City Council and Tasman District Council oversaw a process involving analysis and preparation of a Plan Proposal, public notification for submissions and running workshops, hearing of submitters, preparing recommendations on submissions and redrafting of the Plan along with its supporting cost benefit analysis, decision reports and process reports as final documents for the two full councils to consider for final approval.

Biosecurity Staff have been involved throughout the RPMP preparation process assessing the risk posed by potential pest species, their current and potential future distribution, our ability to control these species as well as the likelihood of success along with the legal justification for their inclusion within the Plan.

External costs involved in the preparation of the new RPMP is not a Regional Pest Management Strategy Operational Plan work programme and had a separate budget. However this process relied on the extensive knowledge of the Biosecurity Staff whose time has been included within administrative overheads of the Operational Plan and was within the projected budget. The actual staff time involved in the RPMP review equates to approximately one half of the administration expenditure (approx. $50,000).

The new Regional Pest Management Plan came into force on 1 July 2019 and is accompanied by a new Operational Plan which is the companion document to the report.

Attachment 2

Tasman-Nelson Regional Pest Management Plan 2019-2029

Operational Plan 2019-2020 (Volume 2: Nelson Region)

Nelson City Council
te kaunihera o whakatū

tasman
district council

A2262413

Executive Summary

Having an Operational Plan is a specific requirement under section 100B of the Biosecurity Act 1993, in relation to implementing the regulatory provisions of the *Tasman-Nelson Regional Pest Management Plan 2019-2029* (the RPMP). The RPMP provides a framework for the efficient and effective management or eradication of specified organisms (declared 'pests') across the Nelson and Tasman regions.

This is Volume 2 of a two-part Operational Plan that sets out the pest management work that Tasman District Council (TDC) and Nelson City Council (NCC) intend to carry out over the 2019-2020 financial year. This volume specifically pertains to work to be undertaken in the Nelson City region, including exclusion, eradication, progressive containment and sustained control. In addition, a list of species banned from sale or distribution is provided, along with a list of pests of interest which are not specifically provided for in Nelson through RMPM rules.

In addition to implementing the RPMP, Nelson City Council undertakes a variety of pest management work for the protection of valuable biodiversity assets at high priority sites and the corridors and networks that link these sites. These site-led programmes are largely non-regulatory (their implementation does not rely on rules in the RPMP), though the RPMP rules and Biosecurity Act 1993 provisions still apply to those pests that feature in the regulatory section of the RPMP. More detail about Nelson City Council's non-regulatory biosecurity programmes can be found in Section Four.

Table of Contents

1. Introduction

1.1 Background

Under the Biosecurity Act 1993 (the Act), Nelson City Council (NCC) and Tasman District Council (TDC) have prepared the *Tasman-Nelson Regional Pest Management Plan 2019-2029* (the RPMP). The RPMP provides a framework for the efficient and effective management or eradication of specified organisms (declared 'pests') across the Nelson and Tasman regions. The RPMP names 59 pest plants, 19 pest animals and four fungi/bacteria as pests. Its key purpose is to outline how each pest or pest grouping will be managed over the 10-year period, to reduce or negate their threats to the environmental, economic and cultural/social values of the regions. The RPMP allows the two Councils to use the relevant advisory, service delivery, regulatory and funding provisions available under the Act to deliver the specific objectives identified in Part Two of the RPMP: Pest Management (the framework, pest programmes and monitoring). The RPMP became operational on 1 July 2019.

While TDC is the named management agency under the RPMP and is the primary agency contracted by NCC to deliver many of the regulatory aspects of the RPMP, NCC is a proactive partner in RPMP implementation. For Taiwan cherry and *Sabella*, NCC's role extends to being the management agency for activities that occur within the Nelson City jurisdiction, including rule enforcement, and monitoring and reporting against RPMP objectives. Under section 100B of the Biosecurity Act 1993, the management agency must prepare an operational plan within three months of the RPMP becoming operative, and review performance against it annually[1]. This document fulfils that obligation.

NCC is also building capacity to deliver other biosecurity operational tasks such as advice and advocacy for pest management, working closely with TDC for the delivery of RPMP services across Nelson City. Furthermore, NCC is engaged in a variety of programmes to deliver pest management for biodiversity outcomes outside the regulatory auspices of the RPMP.

1.2 Operational Plan Scope and Format

Because each council is responsible for reporting pest management activities against its own Annual Plan targets, an operational plan has been prepared for each region.

This document *(Tasman-Nelson Regional Pest Management Plan 2019-2029 Operational Plan 2019-2020; Volume 2: Nelson Region* outlines the nature and scope of activities that NCC and TDC intend to undertake for pest management across Nelson City over the 2019-2020 financial year. This operational plan delivers on the key priorities for pest management established through the RPMP, and also details the non-regulatory pest management work undertaken by NCC outside the auspices of the RPMP.

In this document, the subjects (pests or groups of pests) are arranged as:

- **Exclusion Pests** – The exclusion of Cape tulip, Chilean needle grass, hornwort, Indian myna, Johnson grass, koi carp, *Phragmites*, rooks, Senegal tea, velvet leaf, wallabies and water hyacinth from the Nelson region. General surveillance (and

[1]NCC has decided to prepare an annual Operational Plan because of the many different aspects of pest mangement covered, some of which may vary year to year. Copies are made publicly available (via the NCC Is website) and will be provided to interested parties and the Minister for Primary Industries (via MPI).

management) for these pests is undertaken pan-regionally with the intent to prevent their establishment in Nelson City.

- **Eradication pests** – The eradication of African feather grass, Bathurst bur, boneseed (outside Port Hills), boxthorn, cathedral bells, climbing spindleberry, *Egeria*, entire marshwort, Himalayan balsam, Indian ring-neck parakeet (feral), knotweeds (Asiatic, giant, and hybrids), Madeira vine, certain pest fish (gambusia, perch, rudd and tench), red-eared slider turtles (feral), *Sabella*, saffron thistle, *Spartina*, Taiwan cherry, and wilding kiwifruit from the Nelson City region in the short to medium term. Eradication involves reducing the infestation density of the subject to zero levels. Their rate of increase or geographic extent is not well known but is assumed to be at low densities or low geographic spread.

- **Progressive Containment Pests** –The containment and reduction of the geographic distribution of *Bomarea*, Chinese pennisetum, Nassella tussock, purple loosestrife, reed sweet grass, variegated thistle, and white-edged nightshade to specific areas over time. Containment usually arises in situations where the subject is at high densities in part(s) of each of the Tasman and Nelson City regions, but of low extent or limited range in other parts. Eradication is not feasible, but it is realistic to prevent the pest from spreading to other parts of the regions or to attempt eradication of the pest from other parts of these areas.

- **Sustained Control Pests** –The intermediate outcome is to provide for the ongoing control of pip fruit industry pests (black spot, European canker, coddling moth, fireblight, and powdery mildew), blackberry, broom, chocolate vine, giant buttercup, gorse, *Gunnera*, *Lagarosiphon*, nodding thistle, Queensland poplar, ragwort, yellow flags and yellow jasmine to reduce their impacts and spread to other properties. The focus is on the densities of the pests and ensuring they do not reach a level where they are causing significant effects on neighbours, where those neighbours are undertaking control work. Sustained control is a strategy for pests of low to moderate densities but of such wide geographical spread that they cannot feasibly be eradicated.

- **Other RPMP Pests** – these other organisms are declared pests in the RPMP. The RPMP contains specific locations where these pests may be managed using rules, even though they may still be managed in other parts of the region using non-regulatory or voluntary measures. Section 53 of the Biosecurity Act 1993 prohibits the sale and propagation of the following pests anywhere in the Nelson City region: climbing asparagus, banana passionvine, old man's beard, wild ginger, woolly nightshade, and yellow bristle grass.

- **Nelson City Site-led Programmes** – under these programmes, organisms of interest are managed together to reduce their combined impacts on a value of a place.

1.3 Overarching Objectives for 2019-2010

To advance the objectives of the RPMP, each pest has an objective and target for 2019-2020 under this Operational Plan. These can be summarised into four aspirational objectives to be achieved over the year:

1. No new incursions of Exclusion Pests;
2. Eradication Pests do not expand outside known location and extent, and show some reduction in extent during the 2019-2020 year;
3. 100% compliance with Notices of Direction;

4. Increased knowledge of the location, extent, severity and trends of RPMP pests in the Nelson Region.

1.4 Operational Plan Period

While indicative pest management budgets are included in the 10-year RPMP, they are subject to change through each council's Annual Plan via their Long Term Plans (LTPs). The *Tasman-Nelson Regional Pest Management Plan 2019-2029 Operational Plan 2019-2020; Volume 1;* provides a more up-to-date version of pest management budgets and targets to deliver on the RPMP. *Volume 1* is a one-year plan based on TDC's 2019-2020 Annual Plan. It includes the component of RPMP delivery for Nelson City which NCC funds TDC to undertake.

In keeping with *Volume 1* and to achieve alignment with NCC's Annual Plan, this operational Plan (*Volume 2*) is also a one-year plan. The current LTPs for both Tasman District Council and Nelson City Council are due for renewal at the end of June 2021. Consideration will be given to aligning budgets and targets in future Operational plans with the councils' three yearly reviews of their LTPs.

1.5 Biosecurity is Everyone's Business

Under the RPMP, much of the responsibility for pest control lies with occupiers, land owners and land managers. Enforcement activities will ensure that these people are aware of and meet their obligations for pest management on their properties and places, by adhering to RPMP rules in the Nelson regional jurisdiction. This will be supported by the delivery of other services such as public education and advocacy, and the release of biocontrol agents where appropriate. Service delivery may include pest control where there is a clear justification and regional benefit (e.g. Taiwan cherry eradication).

Nelson City Council and Tasman District Council benefit from a strong working relationship and collaborate often with other agencies involved in pest management, particularly the Department of Conservation (DOC), Ministry for Primary Industries (MPI) and neighbouring Marlborough District Council (MDC), which is the management agency for the Marlborough RPMP. Coordination of pest management efforts is also actively encouraged between several community groups and trusts, the eight iwi organisations in the 'Top of the South' area and individual occupiers where appropriate. Simply put, *Biosecurity is Everyone's Business*.

2. Implementation of Programmes

The councils achieve practicable pest management outcomes through the following methods and resources:

- Requirement to Act – RPMP rules require pests to be reported to TDC/NCC and to be controlled by occupiers. All programmes require reporting on actions taken and outcomes achieved.

- Inspections, monitoring and surveillance – regular property inspections ensure that RPMP rules are being adhered with. Enforcement action is initiated where rules are breached, however every effort is made to achieve voluntary compliance first. Monitoring is also carried out to determine effectiveness of control. Surveillance activities identify new pest issues and ensure that current problem pests and sites are not getting worse.

- Service delivery – involves undertaking direct control of generally low incidence, high threat pests. These pests may be difficult for occupiers to identify and/or control or with such low densities it is more cost efficient for one overall regional approach. Service delivery also includes providing control tools where appropriate (e.g. traps, chemicals) and releasing biological control agents (e.g. woolly nightshade lace bug or rabbit haemorrhagic disease – RHD). The councils adopt 'good practice' for all control techniques and adhere to all legal requirements around using herbicides and pesticides and any other agrichemical. Where appropriate, NCC will engage with iwi and stakeholder groups to minimise the risks and effects of the use of herbicides and pesticides, and will consider other methods to manage pests.

- Advocacy and education – to help occupiers control pests the councils provide practical advice and general education and awareness around impacts of pests and pathways (vectors) of pest spread. This activity includes developing / promoting 'good practice' around control methods aimed at pest management. The councils will promote the use of environmentally safe pest control techniques including alternatives to the use of herbicides and pesticides for control purposes. TDC will also provide general advice on RPMP rules and the Biosecurity Act 1993 on request.

2.1 Management and Reporting

Pest management is undertaken by council staff, other agencies, contractors and volunteers. As the lead management agency for the RPMP, TDC is primarily responsible for reporting on activities and progress during the year. It audits all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, reports that information and progress against the targets set out in this operational plan through the RPMP Annual Report to NCC.

As the lead management agency for most pests, TDC will also report on the number of instances in which it has used the powers in the RPMP to enforce rules or take action on default. There are exceptions in this operational plan where other agencies may also use authorised persons to enforce the RPMP. Examples include Taiwan cherry (NCC is the lead management agency for Nelson City), pest fish (led by DOC) and Mediterranean fanworm *Sabella spallanzanii* (co-managed by TDC, NCC, and MPI). In these instances, reporting on enforcement and progress against targets is a joint responsibility. Currently *Sabella* is subject to a separate Operational Plan jointly delivered by the three Top of the South Councils (TDC, MDC and NCC) and will be reported on in parallel with this operational plan.

3. Pests / Pest Programmes

3.1 Exclusion Pests

Exclusion Pests are pests not known to be present in the Tasman or Nelson City regions. However, some have been historically present and continued vigilance for these is maintained. The pests on this list and lead management organisations are:

- Cape tulip (*Moraea flaccida*) (MPI)
- Chilean needle grass (*Nassella neesiana*) (TDC)
- Hornwort (*Ceratophyllum demersum*) (TDC)
- Indian myna (*Acridotheres tristis*) (TDC)
- Johnson grass (*Sorghum halepense*) (MPI)
- Koi carp (*Cyprinus carpio*) (DOC)
- Phragmites (*Phragmites australis*) (MPI)
- Rooks (*Corvus frugilegus*) (TDC)
- Senegal tea (*Gynocornis spilanthoides*) (TDC)
- Velvetleaf (*Abutilon theophrasti*) (TDC)
- Wallabies (Bennett's and dama) (*Macropus rufogriseus and M. eugenii*) (TDC)
- Water hyacinth (*Eichhornia crassipes*) (MPI)

2019-2020 Objective
Prevent the establishment of these pests in the Tasman and Nelson City regions.

2019-2020 Operational Overview
Under the RPMP, occupiers are required to report sightings of any suspected Exclusion Pests to Tasman District Council. TDC will forward this report to the lead management organisation, which will undertake management responsibility for these pests working with other agencies and occupiers as appropriate. TDC and NCC will undertake surveillance in areas most likely to be infested and provide information to all interested parties on Exclusion Pests, their potential impact, and vectors.

2019-2020 Targets

- NCC will report the discovery of a pest to the lead management organisation (and TDC where it is not the lead) within five working days.
- Where TDC is the management organisation, it will make an assessment within five working days of a pest discovery, and undertake delimitation of the pest and define a control strategy within 30 working days depending on the inputs required.
- TDC will undertake targeted surveillance of at-risk sites annually.
- Exclusion pests will not have established populations in the Tasman and Nelson regions at the end of 2020.
- All notices of direction (NODs) will have been assessed for compliance and appropriate enforcement action taken.

Monitoring and Reporting
Monitoring and reporting for the exclusion pest programme are a joint responsibility. The agency responsible for direct action (if not TDC) is responsible for reporting on the actions taken. TDC and NCC will undertake general surveillance for these species across the Nelson region and record the point location of new infestations found. TDC will audit all reports to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2 Eradication Pests

3.2.1 African Feather Grass

(*Cenchrus macrourus / Pennisetum macrourum*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of African feather grass to Tasman District Council, the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- The extent to which this pest affects the Nelson City region are identified.
- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier are visited (and treated if necessary), prior to flowering.
- All monitoring and at-risk sites are visited (and treated if necessary) by July 2020.
- Fewer than 10% of monitoring sites become reactivated.
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.2 Bathurst Bur

(*Xanthium spinosum*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase. Presently, Bathurst bur is understood to be absent from the Nelson City region.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of Bathurst bur to Tasman District Council. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Nelson City remains free of this pest.
- New sites are reported to TDC within five working days of discovery.
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

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3.2.3 Boneseed (Outside Port Hills)

(*Chrysanthemoides monilifera*)

2019-2020 Objective

At all known sites within the boneseed eradication area, destroy this species at a rate that exceeds natural increase. Control all new infestations within the boneseed eradication area to zero density.

2019-2020 Operational Overview

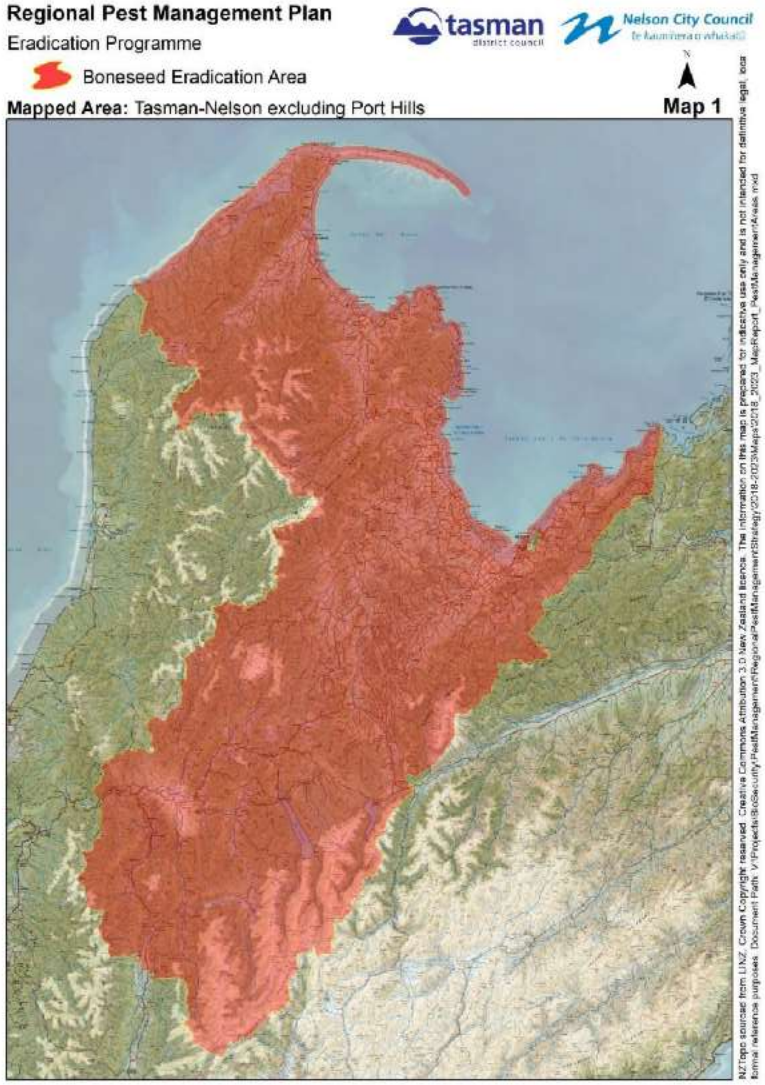
Under the RPMP, occupiers are required to report sightings of boneseed within the boneseed eradication area to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest inside the boneseed eradication area (Map 1) which is everywhere in Nelson City region EXCEPT the Port Hills (Map 1.1). Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

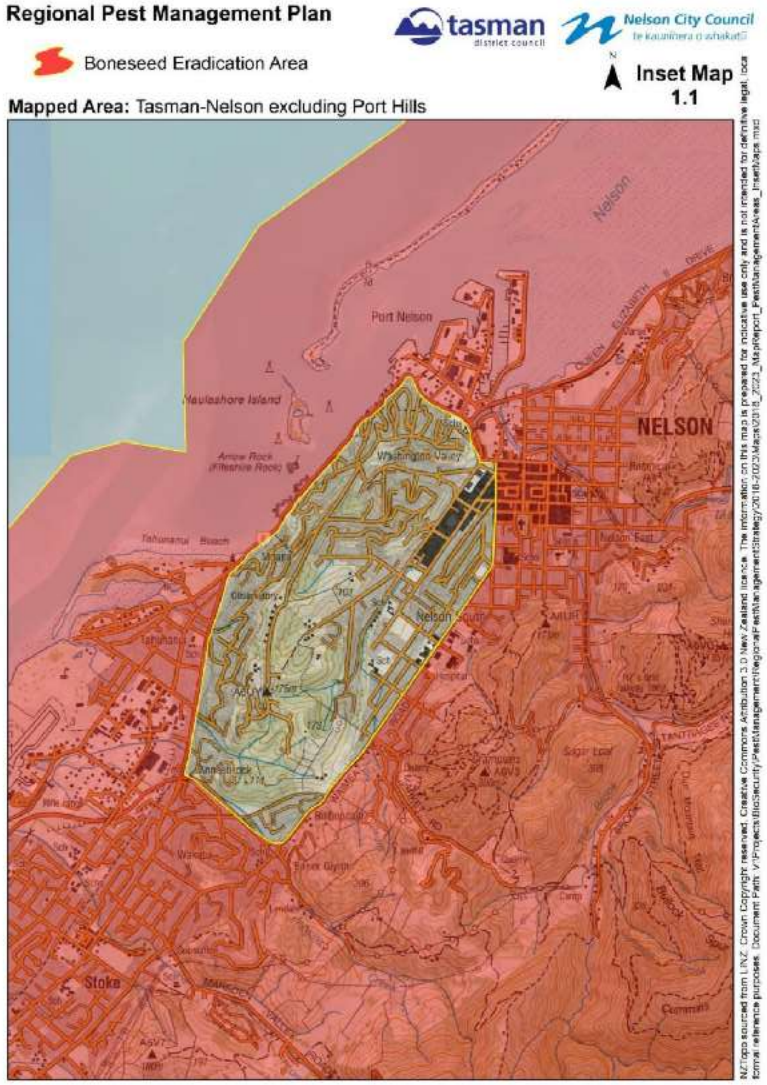
2019-2020 Targets

- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites outside the Port Hills will be visited (and treated if necessary), prior to flowering.
- All monitoring and at-risk sites outside the Port Hills will be visited (and treated if necessary) prior to June 2020.
- Newly identified infestations outside the Port Hills will be delimited and controlled to zero density.
- At least 70% of the active sites from 2018-2019 are smaller in area in 2019-2020
- At least 5% of the active sites from 2018-2019 are reported as zero density for 2019-2020.
- Fewer than 20% of monitoring sites become reactivated.
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances it has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of an infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.


Regional Pest Management Plan
Eradication Programme
Boneseed Eradication Area
Mapped Area: Tasman-Nelson excluding Port Hills
Map 1
tasman district council
Nelson City Council
te kaunihera o whakatū


Regional Pest Management Plan
Boneseed Eradication Area
Mapped Area: Tasman-Nelson excluding Port Hills
Inset Map 1.1
tasman district council
Nelson City Council
te kaunihera o whakatū
NELSON
Port Nelson
Nelson
Stoke

3.2.4 Boxthorn

(*Lycium ferocissimum*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase. Note; all infestations are known and management mainly involves destruction of individual plants discovered during general surveillance.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of boxthorn to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites be reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier be visited (and treated if necessary), prior to flowering.
- All monitoring and at-risk sites be visited (and treated if necessary) by June 2020.
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.5 Cathedral Bells

(*Cobaea scandens*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase. Note; all infestations are known and management mainly involves destruction of individual plants discovered during general surveillance.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of cathedral bells to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites be reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier be visited and treated (if necessary), prior to flowering.
- All monitoring sites and at-risk sites be visited (and treated if necessary) by June 2020.
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.6 Climbing Spindleberry

(*Celastrus orbiculatus*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase. Note; all infestations are known and management mainly involves destruction of individual plants discovered during general surveillance.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of climbing spindleberry to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be visited and treated (if necessary) at leaf yellowing in May.
- All monitoring sites and at-risk sites will be visited (and treated if necessary) by June 2020.
- All notices of direction assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.7 Egeria

(*Egeria densa*)

2019-2020 Objective

Destroy this species at a rate that exceeds natural increase. No new waterbodies become infested. Note: All known sites in 2011 are historic and the Tasman and Nelson regions are believed to be largely free of this pest.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of *Egeria densa* to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites be reported to TDC within 5 working days of discovery.
- All monitoring sites and at-risk sites be visited (and treated if necessary) by June 2020.
- Newly identified infestations in waterbodies that are otherwise clear of this pest be delimited and controlled to zero density.
- Fewer than 10% of monitoring and at-risk sites become reactivated.
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.8 Entire Marshwort

(*Nymphoides geminata*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase. No new waterbodies infested.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of Entire Marshwort to Tasman District Council, the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier be visited annually and treated (if necessary).
- All monitoring sites and at-risk sites be visited (and treated if necessary) by June 2020.
- Newly identified infestations in waterbodies that are otherwise clear of this pest be delimited and controlled to zero density.
- Fewer than 10% of monitoring and at-risk sites become reactivated.
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.8 Himalayan Balsam

(Impatiens glandulifera)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of Himalayan balsam to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be visited (and treated if necessary) during flowering (around December).
- All monitoring sites and at-risk sites will be visited (and if necessary treated) by June 2020.
- All notices of direction will be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.9 Indian Ring-necked Parakeet (feral)

(*Psittacula krameri*)

2019-2020 Objective

Remove Indian ring-necked parakeets from the wild as and when they are known.

2019-2020 Operational Overview

Under the RPMP, everybody is required to report the presence of wild Indian ring-necked parakeet to Tasman District Council. TDC will assist occupiers to eradicate this pest from their property. TDC and NCC will provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- The presence of wild or escaped Indian ring-necked parakeet is reported to TDC within five working days of discovery.
- There is not a persistent Indian ring-necked parakeet population in the Tasman District and Nelson City as at June 2020.
- All notices of direction will have been assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the point-location of birds will be recorded. TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.10 Knotweeds (Asiatic, giant, and hybrid)

(*Fallopia japonica* and *F. sachalinensis*)

2019-2020 Objective

Reduce known infestations over the length of the Sherry and Riuwaka Rivers and Upper Wangapeka, Moutere, Motueka, and Waimea River catchments, and identify their extent in Nelson City catchments.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report the presence of knotweeds on the lands they occupy to Tasman District Council. Occupiers are also required to undertake control of these pests. TDC will assist private occupiers with undertaking control following the best practice guidelines for the use of the herbicide "Imazapyr". The infestations will be treated once annually. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of these pests, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites are reported to TDC within five working days of discovery.
- Any occupier who agrees to manage knotweeds under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest(s) on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction will be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.11 Madeira Vine

(*Anredera cordifolia*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase. Note: the main vector of this pest is people transferring tubers from one place to another deliberately or accidentally in garden waste. Infested sites can be persistent even with treatment.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of Madeira vine to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use. TDC and NCC will undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be visited and treated (if necessary), during flowering (around May).
- All monitoring sites and at-risk sites will be visited (and treated if necessary) by June 2020.
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.12 Pest Fish

The Department of Conservation is the lead management organisation for the eradication of introduced pest fish species to the Tasman and Nelson regions. The councils support this work through general surveillance and advocacy. TDC will undertake enforcement when required. The pest fish to be eradicated are[2]:

- Gambusia (*Gambusia affinis*)
- Perch (*Perca fluviatilis*)
- Rudd (*Scardinius erythropthalmus*)
- Tench (*Tinca tinca*)

2019-2020 Objective
At all known sites, remove these species at a rate that exceeds natural increase.

2019-2020 Operational Overview
Under the RPMP, occupiers are required to report sightings of any pest fish to the Department of Conservation, which will undertake management as required. Where appropriate individual DOC officers will be warranted as Authorised Persons under the RPMP to confer entry and enforcement powers. TDC will assist with operations and rule enforcement where required, and provide information to all interested parties on identification of these pests, control measures, potential impact, and vectors. NCC staff will pass on to DOC and TDC the location and species name of any pest fish identified during general surveillance.

2019-2020 Targets
- New sites are reported to the Department of Conservation by TDC within five working days of discovery.
- Upon delegating powers as Authorised Persons to DOC staff, the councils and DOC will set up an inter-agency reporting framework so that the activities of DOC are reported to the councils in time to be included as a summary to the RPMP Annual Report to both councils.
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting
Monitoring and reporting for these pests are a joint agency role. At the request of NCC, DOC will provide a brief report on actions undertaken over the year. As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. TDC and NCC staff will record and report to DOC the point location of new infestations found. TDC, in collaboration with NCC staff will report progress against targets through the RPMP Annual Report to NCC.

[2] Note: Koi carp, which is also a pest fish managed by DOC, is covered in the "Exclusion Pest" category in the first instance.

3.2.13 Red-eared Slider Turtles (feral)

(*Chrysemys scripta elegans*)

2019-2020 Objective

Reduce all known infestations to zero density.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report the presence of feral red-eared slider turtles on the lands they occupy to Tasman District Council. TDC will work with occupiers to manage this pest. TDC and NCC also undertake monitoring/surveillance of at-risk sites. TDC will also provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- The presence of feral red-eared slider turtles is reported to TDC within five working days of discovery.
- No persistent red-eared slider turtle population in the Tasman District or Nelson City as at June 2020.
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the point location of infestation will be recorded. TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.14 Sabella (Mediterranean fanworm)

(*Sabella spallanzanii*)

2019-2020 Objective

Reduce all known infestations to zero density.

2019-2020 Operational Overview

Under the RPMP, any marine based occupiers and operators, including marina personnel, who identify the presence of *Sabella* are required to report it to TDC and/or MPI. They may choose to report to NCC, who will pass on the information as per the targets below. NCC works with TDC, MDC and MPI under the Top of the South Marine Biosecurity Partnership (TOSMBP) to destroy any infestations as and when they are identified. *Sabella* has its own 2019-2020 Operational Plan, which details the activities that NCC will undertake under the TOSMBP. Activities include managing infestations and surveillance. NCC staff and the TOSMBP coordinator will also provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors.

2019-2020 Targets

- The presence of *Sabella* is reported to MPI, the TOSMBP coordinator, and TDC within five working days of discovery.
- Monitoring and at-risk sites will be surveyed in December 2019/January 2020 (Nelson swing moorings) and May 2020 (Nelson swing moorings and Nelson Marina) or as otherwise determined under the TOSMBP Marine Biosecurity Operational Plan.
- All known infestations of *Sabella* are treated by May 2020.
- All known infestations that were active in 2018-2019 are confirmed as destroyed by June 2020.
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

Monitoring and reporting for these pests is a joint agency role. As national lead agency for this Notifiable Organism, MPI is responsible for reporting to the Top of the South Marine Biosecurity Partnership on instances reported to it and the actions it takes. Marina operators, including slipway and travel lift operators, must report sightings of *Sabella* to MPI, TDC or NCC. They should also gather useful source information such as ship origin and travel itinerary.

As a joint Management Agency for the RPMP, NCC will record the number of instances it has intervened, including the numbers of Notice of Direction issued, any actions taken on default, and the outcomes of the interventions. For compliance and active site monitoring, the extent of infestation and cover/density of *Sabella* will be recorded. NCC will also undertake strategic surveillance for this species in ports, marinas and at-risk vessels as planned under the TOSMBP Marine Biosecurity Operational Plan. Surveillance includes dive surveys of known and at-risk sites, random vessel visits over summer and sampling water for the presence of *Sabella*. NCC will record the point location of new infestations and other details that may lead to identifying source of origin, and assist in eradication of the infestation. NCC will share this information with MPI, TDC and MDC though the TOSMBP. In collaboration with NCC staff, the TOSMBP coordinator will report general progress against RPMP operational plan (above) targets through the RPMP Annual Report to NCC.

3.2.15 Saffron Thistle

(*Carthamus lanatus*)

2019-2020 Objective

At all known sites, destroy this species at a rate that exceeds natural increase.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of saffron thistle to Tasman District Council, who is the lead management organisation for this work. TDC will work with occupiers to manage this pest, which is primarily by grubbing and removing flower/seed heads. TDC and NCC will also undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- The extent to which this pest affects the Nelson City region is identified.
- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier are visited (and treated if necessary) during flowering (about February).
- All monitoring sites and at-risk sites are visited (and treated if necessary) by June 2020.
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.2.16 Spartina

(*Spartina anglica* and *S. alterniflora*)

The Department of Conservation is the lead management organisation for the eradication of *Spartina* from Tasman and Nelson regions. The infestation is now limited to a few scattered plants.

2019-2020 Objective

At all known sites, remove these species at a rate that exceeds natural increase.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to report sightings of *Spartina* to the Department of Conservation; the lead management organisation for this work. TDC will assist with operations where required, and will provide information to all interested parties on identification of these pests, control measures, potential impact, and vectors. NCC staff will pass on to DOC and TDC the location of any *Spartina* outside the currently known range identified during general surveillance.

2019-2020 Targets

- New sites are reported to the Department of Conservation within five working days of discovery.
- DOC with support from TDC staff will undertake an annual survey of known infestation locations sometime between the months of January to March and apply herbicide to all *Spartina* plants found.
- All notices of direction will be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

Monitoring and reporting for *Spartina* is a joint agency role. At the request of NCC, DOC will provide a brief report on actions undertaken over the year. As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. TDC and NCC staff will record and report to DOC the point location of new infestations found. TDC, in collaboration with NCC staff will report progress against targets through the RPMP Annual Report to NCC.

3.2.17 Taiwan Cherry (and cultivars)

(*Prunus campanulata*)

2019-2020 Objective

Delimit infestations and establish a 15-year operational plan. Reduce the extent of this pest on public lands.

2019-2020 Operational Overview

Under the RPMP, occupiers of lands in the Nelson City region are required to report the presence of Taiwan cherry to NCC. The council (or its contractors) will undertake direct control of these pests where landowners do not wish to undertake control themselves. Where herbicide is used, this will be done following TDC's guidelines for best practice herbicide use.

This year, the focus is to delimit infestation extent (the best time to identify is during flowering in July) and to prepare a 15-year eradication plan. Work to remove mature trees from public lands will continue. TDC will monitor plant retailers and enforce compliance with the ban in the sale and propagation of Taiwan cherry and cultivars. NCC and TDC will provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- New sites are reported to NCC within five working days of discovery.
- Working with occupiers, the extent of total infestation is delimited; identifying the epicentres, mature trees and outer limit of each infestation by May 2020.
- Set up a multi-stakeholder working group by December 2020, whose brief is to develop an eradication plan by May 2021.
- Working with occupiers of public lands, delimit the extent of the infestation on those lands, and remove all mature trees by May 2020.
- All sites treated in 2018-2019 are revisited to assess for re-infestation, and any new trees removed before June 2020.
- The level of re-infestation of sites known in 2018-2019 is less in extent and/or density in 2019-2020.
- Any occupier who agrees to manage Taiwan cherry under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the Nelson City region, NCC will record the number of instances they have intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation is recorded and comment made on plant cover/density (where useful). NCC will also undertake general surveillance for this species across the Nelson City region and record the point location of new infestations found. NCC will report activity and the results of surveys to TDC and, in collaboration with TDC, report progress against operational plan targets through the RPMP Annual Report to NCC.

3.2.18 Wild Kiwifruit, and Unmanaged and Abandoned Vines

(*Actinidia* species)

Kiwifruit can spread into forests by birds carrying seed from unmanaged or abandoned orchards, or from wild (self-propagated) plants. Vines can smother native trees or shrubs and degrade plantation forests. Wilding, unmanaged, or abandoned vines are a potential reservoir of kiwifruit threat organisms such as *Pseudomonas syringae* (Psa), a disease of kiwifruit that has resulted in devastating losses for growers. Kiwi Fruit Vine Health plays a lead role in the management of wilding and abandoned kiwifruit. TDC will enforce the RPMP rules when asked to intervene by the industry.

2019-2020 Objective

Destroy all wilding and abandoned plants before they seed.

2019-2020 Operational Overview

Under the RPMP, everybody is responsible for reporting sightings of wilding kiwifruit to TDC. Occupiers of land with wilding kiwifruit or with unmanaged or abandoned vines on their property are required to destroy these plants prior to setting seed. Kiwi Fruit Vine Health (KVH), plays a lead role in abandoned kiwi fruit orchards and kiwi fruit wilding control. TDC will undertake compliance monitoring and enforcement where necessary. TDC and NCC will also undertake monitoring/surveillance and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- New sites are reported to TDC within 5 working days of discovery.
- Occupiers of newly discovered sites are advised of their obligations under the RPMP within 10 working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be visited to check compliance with the RPMP.
- All known sites shall be destroyed prior to April of the year following the time at which they become known.
- All notices of direction assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

Monitoring and reporting of these pests are the responsibility of KVH. As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC. Data will be shared with KVH.

3.3 Progressive Containment Pests

3.3.1 Bomarea

(*Bomarea multiflora*)

2019-2020 Objective

Within the Nelson City region, eliminate infestations of *Bomarea multiflora* outside the Bomarea Progressive Containment Area.

2019-2020 Operational Overview

Under the RPMP, occupiers outside the Bomarea Progressive Containment Area (Map 4) are required to notify TDC within 5 working days of discovering the pest on their land, and then destroy the infestation within 30 working days. Occupiers within the containment area must destroy infestations prior to flowering annually. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will undertake monitoring/surveillance for the presence of this species in the Nelson City region, and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites are reported to TDC within 5 working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be treated (if necessary) prior to flowering.
- All monitoring sites and at-risk sites outside the containment area will be visited, and if necessary, compliance with the RPMP enforced.
- At least 50% of sites outside the containment reported as active up to 2018-2019 are zero density in 2019-2020.
- Fewer than 10% of monitoring sites become re-activated.
- Any occupier who agrees to manage *Bomarea* under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation is recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

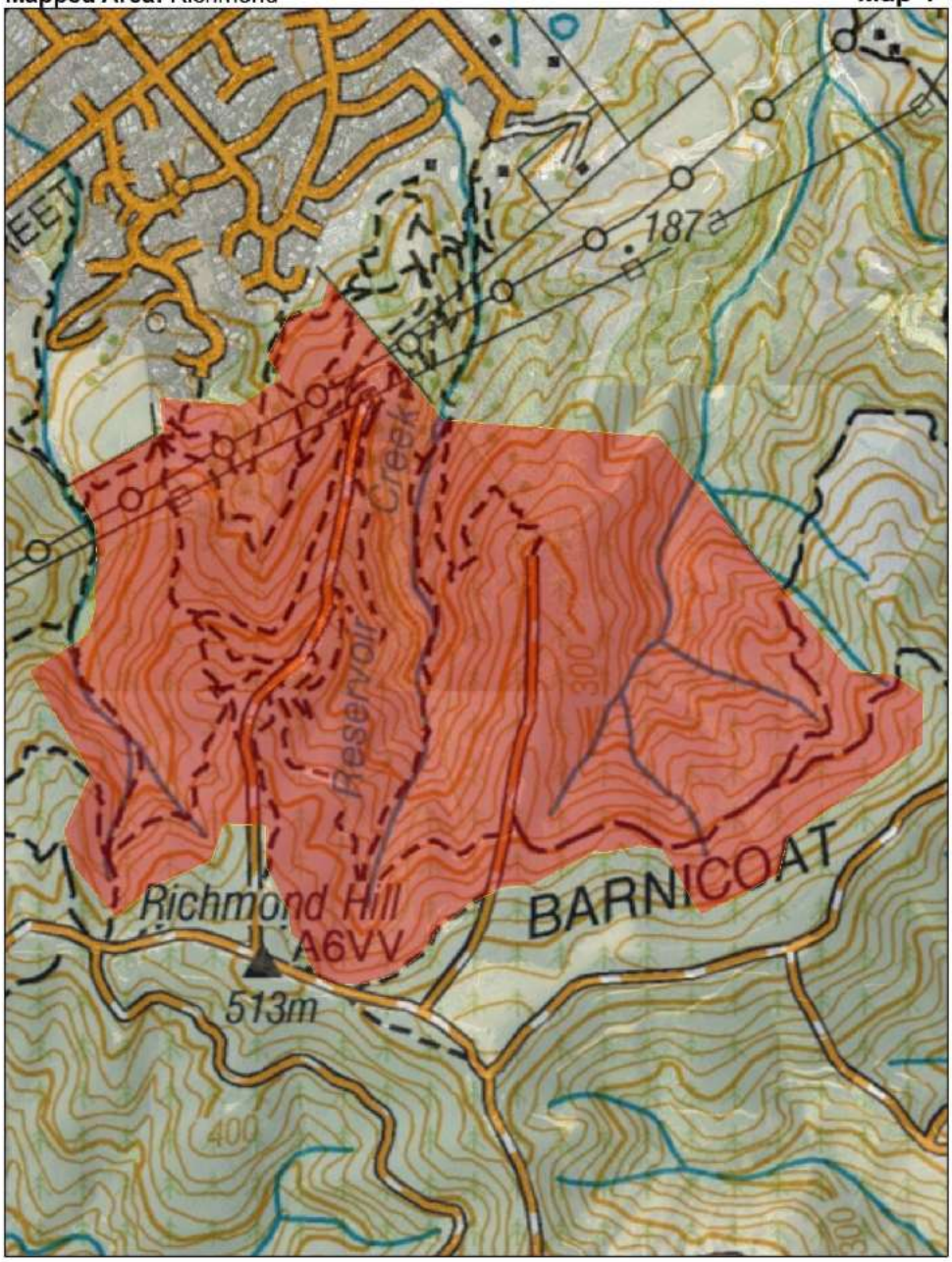
Regional Pest Management Plan

Progressive Containment Programme

Bomarea Progressive Containment Area

Mapped Area: Richmond

Map 4



3.3.2 Chinese Pennisetum

(*Cenchrus purpurascens*)

2019-2020 Objective

Within the Nelson City region, eliminate infestations outside the Chinese Pennisetum Progressive Containment Areas.

2019-2020 Operational Overview

Under the RPMP, occupiers outside the Chinese Pennisetum Progressive Containment Areas (Maps 5.1 and 5.2) are required to notify TDC within 5 working days of discovering the pest on their land, and then destroy the infestation within 30 working days. Occupiers within the containment area must destroy infestations prior to flowering annually. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will undertake monitoring/surveillance for the presence of this species in the Nelson City region, and provide information to all interested parties on identification of this pest, potential impact, and vectors.

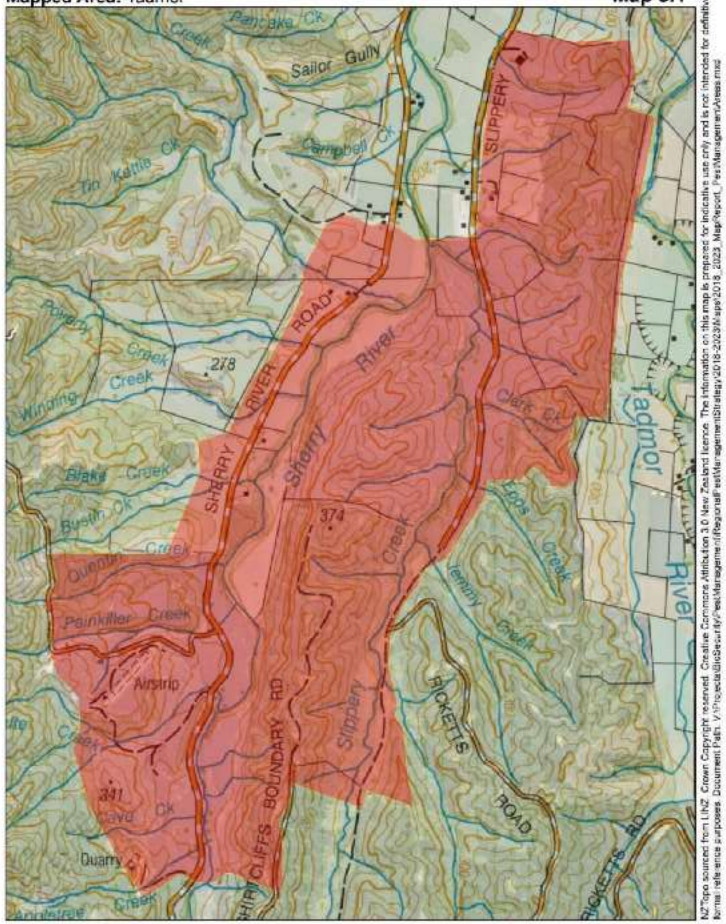
2019-2020 Targets

- This pest does not have established populations in the Nelson City region in 2020.
- New sites are reported to TDC within 5 working days of discovery. These will be treated (if necessary) at flowering time (about February).
- All monitoring sites and at-risk sites outside the containment area will be visited, and if necessary, compliance with the RPMP enforced.
- Fewer than 10% of monitoring sites become re-activated.
- Any occupier who agrees to manage Chinese pennisetum under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

Regional Pest Management Plan
Progressive Containment Programme
Chinese Pennisetum Progressive Containment Area
Mapped Area: Tadmor
Map 5.1



Regional Pest Management Plan
Progressive Containment Programme
Chinese Pennisetum Progressive Containment Area
Mapped Area: Lee Valley
Map 5.2

3.3.3 Nassella Tussock

(*Nassella trichotoma*)

2019-2020 Objective

Within the Tasman and Nelson regions, significantly reduce infestations outside the Nassella Tussock Progressive Containment Area and slowly reduce infestations inside this containment area. Note: *Nassella* tussock is controlled solely by grubbing.

2019-2020 Operational Overview

Under the RPMP, occupiers outside the Nassella Tussock Progressive Containment Area (Map 7) are required to destroy any infestations of *Nassella* tussock on their land prior to flowering annually. Occupiers within the containment are required to destroy these pests on their property as directed by an authorised person. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will undertake monitoring/surveillance for the presence of this species outside the containment area, and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- All known (new and active) sites outside the containment area are treated (if necessary) prior to flowering.
- All monitoring sites and at-risk sites outside the containment area will be visited, and if necessary, compliance with the RPMP is enforced.
- At least 10% of sites outside the containment reported as active up to 2018-2019 are zero density in 2019-2020.
- At least 1% of sites inside the containment area reported as active sites up to 2018-2019 are zero density in 2019-2020.
- Fewer than 10% of monitoring sites become re-activated.
- Any occupier who agrees to manage *Nassella* under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

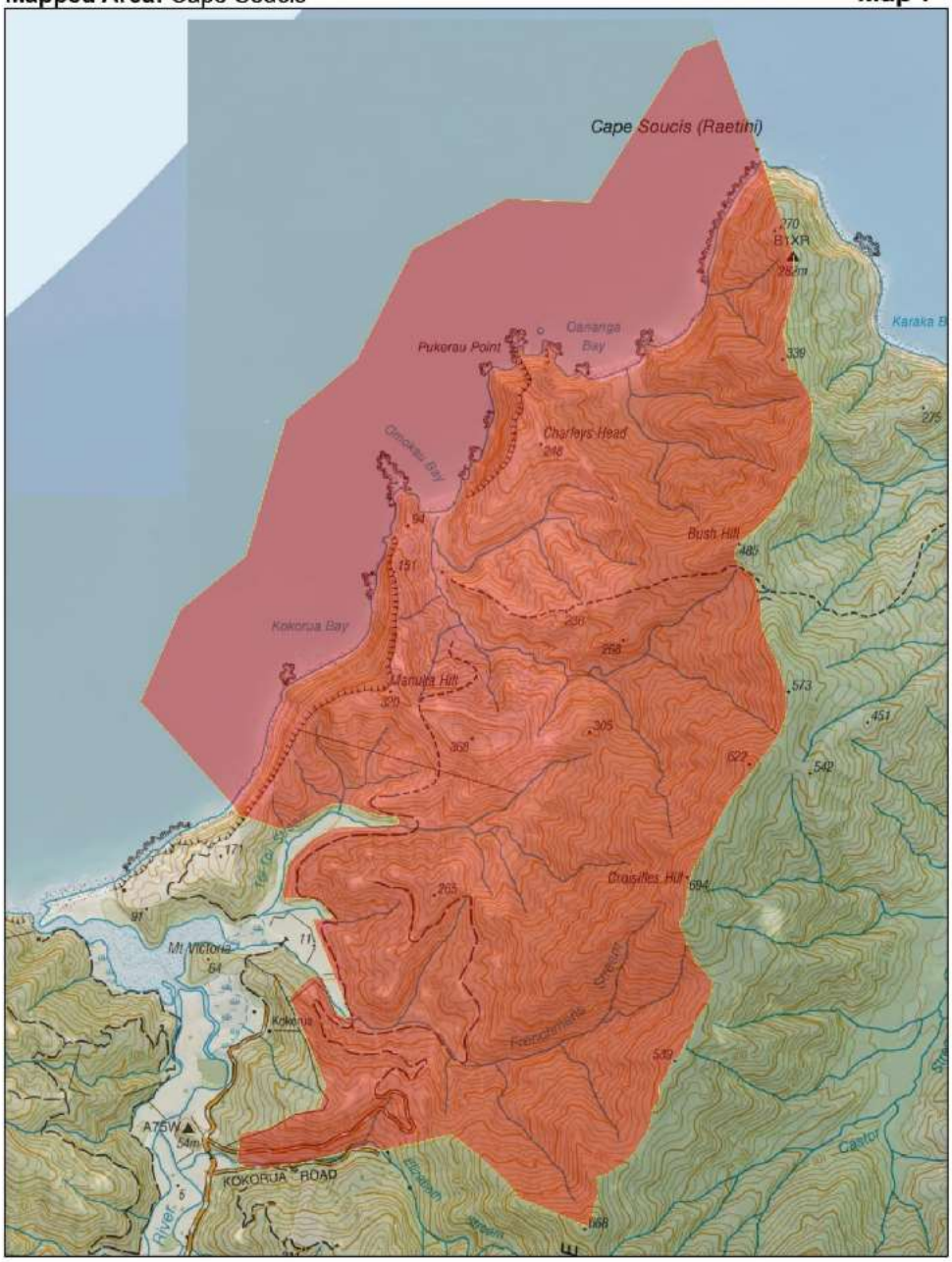
Regional Pest Management Plan

Progressive Containment Programme

Nassella Tussock Progressive Containment Area

Mapped Area: Cape Soucis

Map 7



3.3.4 Purple Loosestrife

(*Lythrum salicaria*)

2019-2020 Objective

Within the Tasman and Nelson regions, eliminate infestations outside the Purple Loosestrife progressive containment areas and reduce infestations inside these containment areas.

2019-2020 Operational Overview

Under the RPMP, occupiers outside the Purple Loosestrife progressive containment areas (Maps 9.1 and 9.2, Appendix 1) are required to notify TDC within five working days of discovering the pest on their land, and then destroy the infestation within 30 working days. Occupiers within the containment area must destroy infestations prior to flowering annually. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will undertake monitoring/surveillance for the presence of this species in the Nelson City region, and provide information to all interested parties on identification of this pest, its potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be treated (if necessary) prior to or at flowering (about January).
- All monitoring sites and at-risk sites outside the containment area will be visited, and if necessary, compliance with the RPMP will be enforced.
- At least 50% of sites outside the containment reported as active up to 2018-2019 are zero density in 2019-2020.
- Fewer than 10% of monitoring sites become re-activated.
- Any occupier who agrees to manage purple loosestrife under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction to be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

Regional Pest Management Plan

Progressive Containment Programme

Purple Loosestrife Progressive Containment Area

Mapped Area: Pohara

Map 9.1

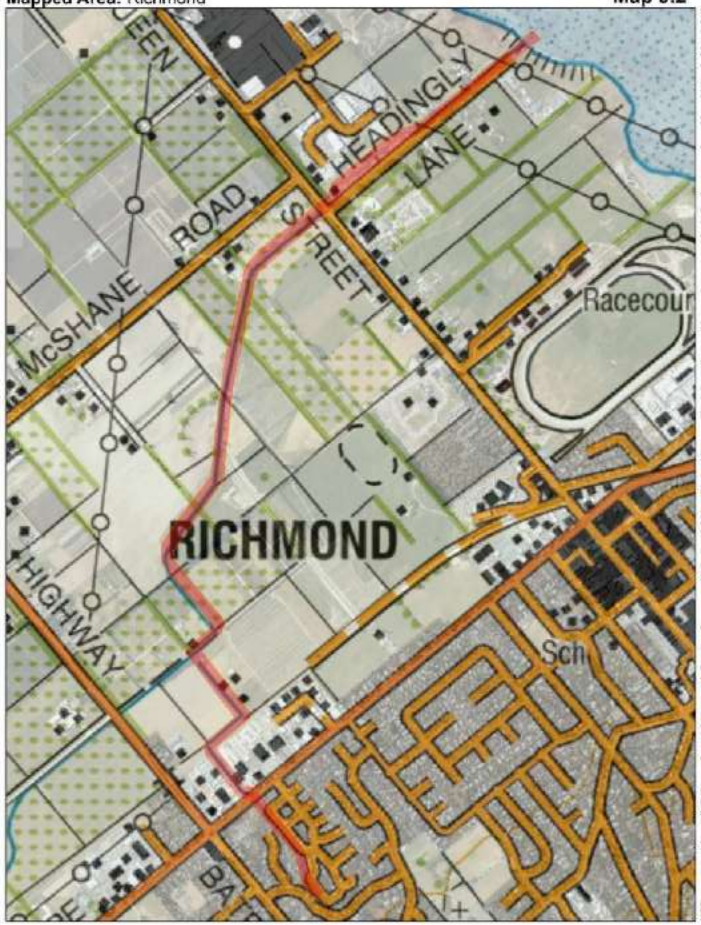
Regional Pest Management Plan

Progressive Containment Programme

Purple Loosestrife Progressive Containment Area

Mapped Area: Richmond

Map 9.2



3.3.5 Reed Sweet Grass

(*Glyceria maxima*)

2019-2020 Objective

Within the Tasman and Nelson regions, eliminate infestations outside the Reed Sweetgrass progressive containment area and reduce infestations inside this containment area.

2019-2020 Operational Overview

Under the RPMP, occupiers outside the Reed Sweetgrass progressive containment area (Map 10, Appendix 1) are required to notify TDC within five working days of discovering the pest on their land, and then destroy the infestation within 30 working days. Occupiers within the containment area must destroy infestations prior to flowering (about May). TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will undertake monitoring/surveillance for the presence of this species in the Nelson City region, and provide information to all interested parties on identification of this pest, its potential impact, and vectors.

2019-2020 Targets

- Identify the extent to which this pest affects the Nelson City region.
- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be treated (if necessary) prior to flowering.
- All monitoring sites and at-risk sites outside the containment area will be visited, and if necessary, compliance with the RPMP will be enforced.
- At least 50% of sites outside the containment reported as active up to 2018-2019 are zero density in 2019-2020.
- Fewer than 10% of monitoring sites become re-activated.
- Any occupier who agrees to manage Reed Sweetgrass under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful).

TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

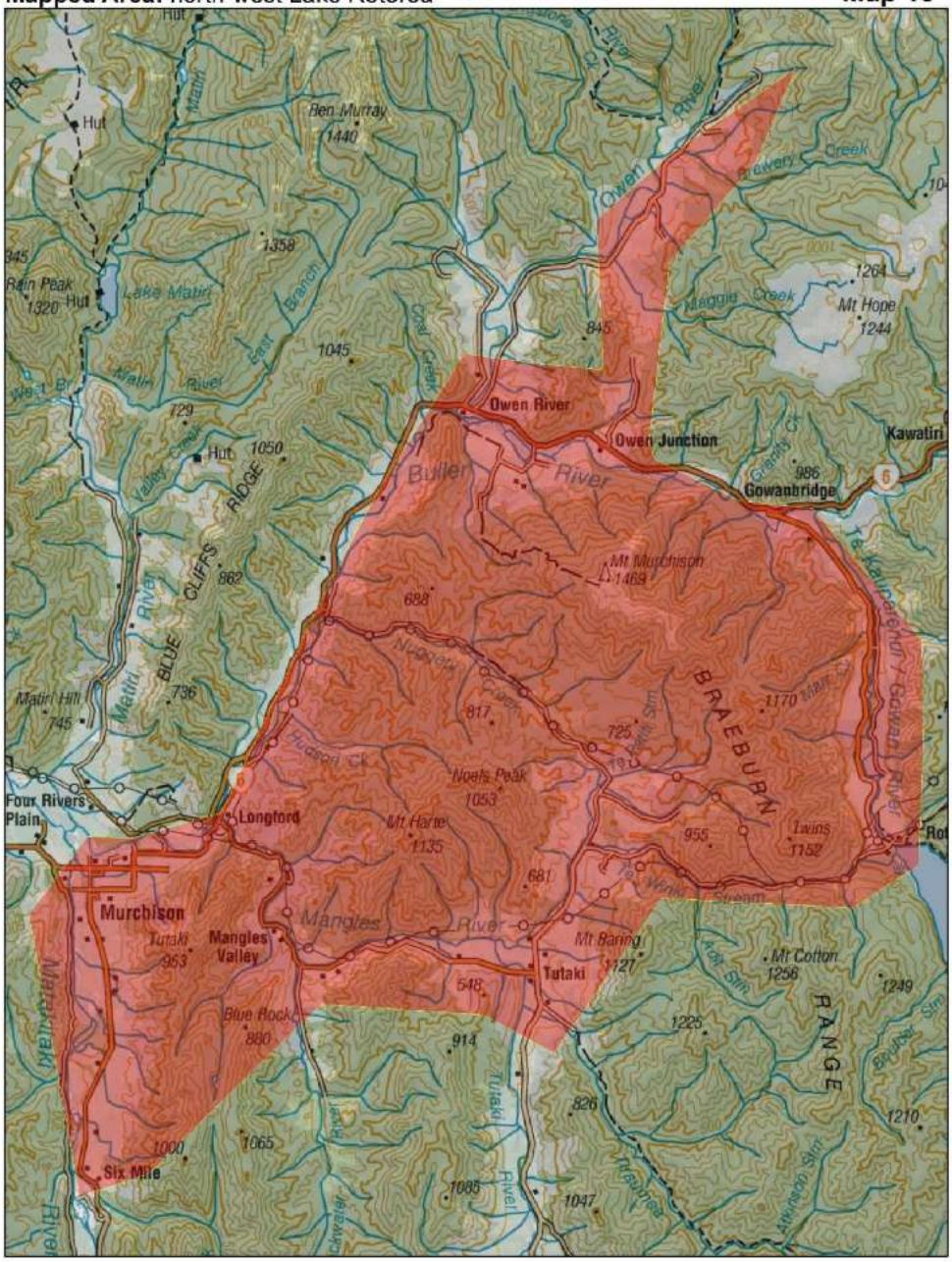
Regional Pest Management Plan

Progressive Containment Programme

Reed Sweet Grass Progressive Containment Area

Mapped Area: north-west Lake Rotoroa

Map 10



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3.3.6 Variegated Thistle

(*Silybum marianum*)

2019-2020 Objective

Within the Tasman and Nelson regions, significantly reduce infestations outside the Variegated Thistle Progressive Containment Area and slowly reduce infestations inside this containment area. Note: Infestations can occur seasonally after soil disturbance in apparently clear areas that have historically had variegated thistle.

2019-2020 Operational Overview

Under the RPMP, occupiers outside the Variegated Thistle Progressive Containment Area (Map 11, Appendix 1) are required to notify TDC within five working days of discovering the pest on their land, and then destroy the infestation within 30 working days. Occupiers within the containment area must destroy infestations prior to flowering annually. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will undertake monitoring/surveillance for the presence of this species outside the containment area, and provide information to all interested parties on identification of this pest, its potential impact, and vectors.

2019-2020 Targets

- New sites are reported to TDC within five working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be treated (if necessary) prior to flowering.
- All monitoring sites and at-risk sites outside the containment area will be visited, and if necessary, compliance with the RPMP will be enforced.
- At least 10% of sites outside the containment reported as active up to 2018-2019 are zero density in 2019-2020.
- At least 1% of sites inside the containment area reported as active sites up to 2018-2019 are zero density in 2019-2020.
- Fewer than 10% of monitoring sites become re-activated.
- Any occupier who agrees to manage variegated thistle under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction be assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

Regional Pest Management Plan

Progressive Containment Programme

Variegated Thistle Progressive Containment Area

Mapped Area: central Tasman District

Map 11

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3.3.7 White-edged Nightshade

(*Solanum marginatum*)

2019-2020 Objective

Within the Tasman and Nelson regions, significantly reduce infestations outside the White-edged Nightshade Progressive Containment Areas (Map 12, Appendix 1) and slowly reduce infestations inside these containment areas.

2019-2020 Operational Overview

Under the RPMP, occupiers outside the White-edged Nightshade Progressive Containment Areas are required to notify TDC within 5 working days of discovering the pest on their land, and then destroy the infestation within 30 working days. Occupiers within the containment area must destroy infestations prior to flowering annually. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will undertake monitoring/surveillance for the presence of this species in the Nelson City region, and provide information to all interested parties on identification of this pest, potential impact, and vectors.

2019-2020 Targets

- New sites are reported to TDC within 5 working days of discovery.
- All known (new and active) sites from 2018-2019 and earlier will be treated (if necessary) prior to seed maturity.
- All monitoring sites and at-risk sites outside the containment area will be visited, and if necessary, compliance with the RPMP enforced.
- At least 10% of sites outside the containment reported as active up to 2018-2019 are zero density in 2019-2020.
- At least 1% of sites inside the containment area reported as active sites up to 2018-2019 are zero density in 2019-2020.
- Fewer than 10% of monitoring sites become re-activated.
- Any occupier who agrees to manage white-edged nightshade under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful).

TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style and, in collaboration with NCC staff, this information and progress against targets will be reported through the RPMP Annual Report to NCC.

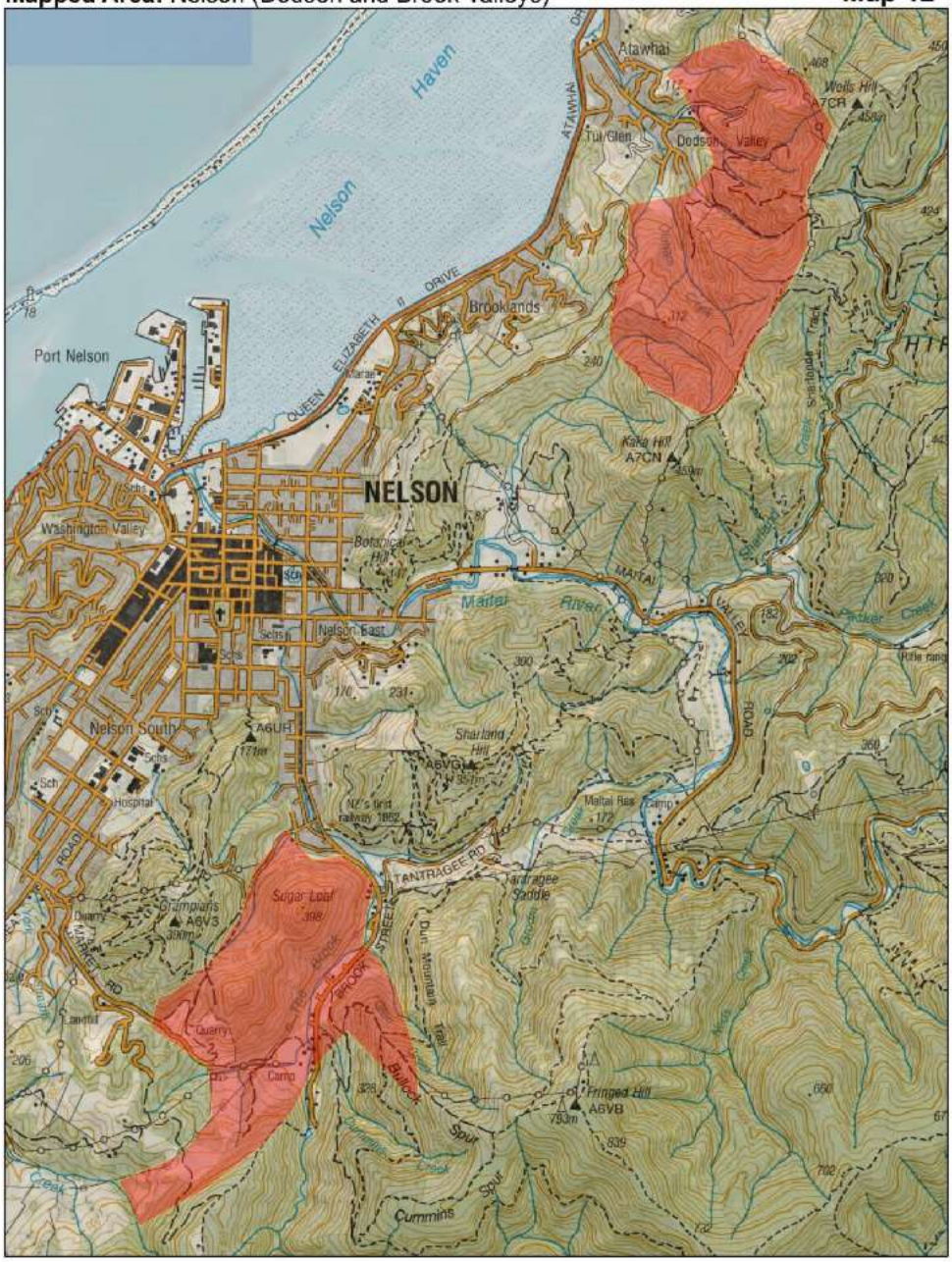
Regional Pest Management Plan

Progressive Containment Programme

White-edged Nightshade Progressive Containment Area

Mapped Area: Nelson (Dodson and Brook Valleys)

Map 12



3.4 Sustained Control Pests

3.4.1 Pip Fruit Industry Pests

Pip fruit industry pests reduce the health of trees and quality of fruit, potentially devastating orchards and exports. The industry itself is primarily responsible for the management of these pests, and TDC will enforce the RPMP rules when asked to intervene by the industry. The pests in this grouping are:

- Black spot (*Venturia inaequalis*)
- Codling moth (*Cydia pomonella*)
- European canker (*Neonectria ditissima*)
- Fireblight (*Erwinia amylovora*)
- Powdery mildew (*Podosphaera leucotricha*)

2019-2020 Objective
Within the Nelson region, treat infestations to an extent that prevents the spread of this species onto land that is clear of this species.

2019-2020 Operational Overview
Under the RPMP, occupiers of pip fruit orchards within 500m of another pip fruit orchard are required to control these pests. Neighbours (including commercial nurseries, private gardens, and other orchards) adjacent to pip fruit orchards that have trees that host any one of these pests shall allow the adjoining orchardist, or an agreed third party, access to control these pests to industry standards. TDC will undertake rule compliance enforcement where it is necessary to achieve this objective. TDC will also provide information to all interested parties on identification of these pests, control measures, potential impact, and vectors.

2019-2020 Targets
- Any occupier who agrees to manage these pests under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest(s) on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting
Monitoring and reporting of these pests are the responsibility of the pip fruit industry. As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.2 Blackberry

(*Rubus fruticosus agg.*)

2019-2020 Objective

Within the Nelson region, treat infestations this species to an extent that prevents the spread of this species onto land that is clear of, or being cleared of this species.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy this pest within 10m of their boundary if their neighbours' land is clear, or being cleared of the pest. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- Any occupier who agrees to manage blackberry under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.3 Broom

(*Cytisus scoparious*)

2019-2020 Objective

Outside the Broom Sustained Control Area, treat infestations of this species to an extent that prevents the spread of this species onto land that is clear of, or being cleared of this species.

2019-2020 Operational Overview

The whole of Nelson City Council region is outside the Broom Sustained Control Area. Under the RPMP, occupiers outside the Broom Sustained Control Area are required to destroy this pest within 10m of their boundary if their neighbours' land is clear, or being cleared of the pest. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- Any occupier who agrees to manage the broom under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.4 Chocolate Vine

(*Akebia quinata*)

2019-2020 Objective

Within the Nelson region, destroy this species to the extent that prevents the spread of this species onto land that is clear of this species. Note: this species was formerly sold and propagated before being declared an NPPA plant in 2008. It is therefore common and difficult to manage in places.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy Chocolate Vine on their property as directed by an authorised person. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- In collaboration with TDC staff, identify priority sites for management.
- All priority sites are inspected annually for compliance with the RPMP.
- Any occupier who agrees to manage Chocolate Vine under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.5 Giant Buttercup

(*Ranunculus acris*)

2019-2020 Objective

Within the Nelson region, treat infestations this species to an extent that prevents the spread of this species onto land that is clear of, or being cleared of this species.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy this pest within 5m of their boundary if their neighbours' land is clear, or being cleared of the pest. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- Any occupier who agrees to manage Giant Buttercup under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.6 Gorse

(*Ulex europaeus*)

2019-2020 Objective

Outside the Gorse Sustained Control Area this area, treat infestations of this species to an extent that prevents the spread onto land that is clear of, or being cleared of this species.

2019-2020 Operational Overview

The whole of Nelson City Council region is outside the Gorse Sustained Control Area. Under the RPMP, occupiers outside the Gorse Sustained Control Area are required to destroy this pest within 10m of their boundary if their neighbours' land is clear, or being cleared of the pest. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- Any occupier who agrees to manage the gorse under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.7 Gunnera Species

(*Gunnera tinctoria and G. manicata*)

2019-2020 Objective

Within the Nelson region, destroy *Gunnera tinctoria* and *G. manicata* to the extent that prevents the spread of this species onto land that is clear of this species.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy these pests on their property as directed by an authorised person. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- In collaboration with TDC staff, identify priority sites for management.
- All priority sites are inspected annually for compliance with the RPMP.
- Any occupier who agrees to manage *Gunnera tinctoria* and *G. manicata* under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will also undertake general surveillance for this species across the Tasman and Nelson regions and record the point location of new infestations found. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.8 Lagarosiphon

(*Lagarosiphon major*)

2019-2020 Objective

Within the Nelson region, prevent the spread of this species into waterbodies that are free of this pest.

2019-2020 Operational Overview

Under the RPMP, boat owners and other water users must remove all fragments of *Lagarosiphon* from boats and equipment when leaving infested waterways. Occupiers of water bodies in Tasman District and Nelson City, on the direction of an authorised person, must control any *Lagarosiphon* on the bed of waterbodies that they occupy. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- Waterbodies that are known to be clear of this pest remain clear.
- In collaboration with TDC staff, priority sites for management are identified.
- All priority sites are inspected annually for compliance with the RPMP.
- Any occupier who agrees to manage *Lagarosiphon* under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the extent of infestation and plant cover/density will be recorded. TDC and NCC will undertake general surveillance for this species across the Nelson region and record the point location of new infestations found outside the known range. NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.9 Nodding Thistle

(*Carduus nutans*)

2019-2020 Objective

Within the Nelson region, treat infestations this species to an extent that prevents the spread of this species onto land that is clear of, or being cleared of this species.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy this pest within 20m of their boundary if their neighbours' land is clear, or being cleared of the pest. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- Any occupier who agrees to manage nodding thistle under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.10 Queensland Poplar

(*Homalanthus populifolius*)

2019-2020 Objective

Within the Nelson region, destroy this species to the extent that prevents the spread of this species onto land that is clear of this species.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy this pest on their property as directed by an authorised person. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- In collaboration with TDC staff, identify priority sites for management.
- All priority sites are inspected annually for compliance with the RPMP.
- Any occupier who agrees to manage Queensland poplar under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.11 Ragwort

(*Jacobaea vulgaris*)

2019-2020 Objective

Within the Nelson region, treat infestations this species to an extent that prevents the spread of this species onto land that is clear of, or being cleared of this species. Note: Biocontrol agents have had a significant impact of reducing ragwort infestations across the Tasman and Nelson regions.

2019-2020 Operational Overview

Under the RPMP, occupiers that have this pest are required to keep their boundary clear of the pest by 20m if their neighbours' land is clear, or being cleared of the pest. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- Any occupier who agrees to manage ragwort under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.12 Yellow Flag

(*Iris pseudacorus*)

2019-2020 Objective

Within the Nelson region, destroy this species to the extent that prevents the spread of this species onto land that is clear of this species.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy yellow flag on their property when directed by an authorised person. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- In collaboration with TDC staff, identify priority sites for management.
- All priority sites are inspected annually for compliance with the RPMP.
- Any occupier who agrees to manage yellow flag under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.4.13 Yellow Jasmine

(*Jasminum humile*)

2019-2020 Objective

Within the Nelson region, destroy this species to the extent that prevents the spread of this species onto land that is clear of this species. Note: the main vector of spread is birds, although occasionally seed is also transported by streams.

2019-2020 Operational Overview

Under the RPMP, occupiers are required to destroy Yellow Jasmine on their property as directed by an authorised person. TDC will undertake monitoring/surveillance for compliance with the rules in the RPMP. TDC and NCC will provide information to all interested parties on identification of this pest, control measures, potential impact, and vectors. NCC may, at its discretion, assist occupiers though service delivery and/or the development of Approved Management Plans in priority biodiversity sites.

2019-2020 Targets

- In collaboration with TDC staff, identify priority sites for management.
- All priority sites are inspected annually for compliance with the RPMP.
- Any occupier who agrees to manage Yellow Jasmine under an Approved Management Plan, has a plan in place within 20 working days of the discovery of the pest on the land they occupy.
- There is 100% occupier compliance with an agreed Approved Management Plan (where such plans are in place).
- All notices of direction are assessed for compliance at expiry of the NOD period and appropriate enforcement action taken.

Monitoring and Reporting

As the Management Agency for the RPMP, TDC will record the number of instances TDC has intervened, including the numbers of Notice of Direction issued, any action taken on default, and the outcome of the intervention. For compliance and active site monitoring, the location of infestation will be recorded and comment made on plant cover/density (where useful). NCC will record and report to TDC any activation of Approved Management Plans. TDC will audit all reports received to ensure consistency in reporting style. This information and progress against targets will be reported through the RPMP Annual Report to NCC.

3.5 Other Organisms of Interest

Not all organisms that are harmful in the Nelson City region are addressed in the RPMP. A list of these organisms appears in Appendix 2 of the RPMP and includes pests that are managed (using rules RPMP) in parts of the Tasman region that do not have rules applicable to Nelson City, including Banana Passion Vine, Climbing Asparagus, and Old Man's Beard. For these species and others not mentioned in the RPMP at all, management is largely a non-regulatory activity, with NCC opting to address these and other pests under NCC Non-regulatory Biosecurity Programmes (see Section 4).

A number of these other organisms of interest have been declared Unwanted Organisms nationally under the Biosecurity Act 1993 and are managed through several different national programmes. These include:

- National Interest Pest Responses (NIPR) programme species;
- National Pest Plant Accord (NPPA) species – some of these 'banned plants' are also named pests in the RPMP;
- National Pest Pet Biosecurity Accord (NPPBA) species;
- Other organisms that are declared Unwanted Organisms but are not covered in the above programmes or the RPMP (e.g. marine organisms *Styela clava* and *Undaria pinnatifida*).

Those species declared nationally as Unwanted Organisms are prohibited from sale, propagation and distribution in accordance with Sections 52 and 53 of the Biosecurity Act 1993. Unwanted Organisms information and management programmes can be found on the MPI website at:

https://www.mpi.govt.nz/protection-and-response/long-term-pest-management/partnerships-programmes-and-accords

The pests that are on the 'organisms of interest' list and are not Unwanted Organisms can also have unwanted effects that occupiers and the general public should be aware of. The management of these pests is limited to those the councils consider most relevant to the Tasman-Nelson region. Community groups are encouraged to submit to council on any plant or animal that may warrant inclusion in the Plan or complementary Biodiversity/Biosecurity Strategy.

4. NCC Non-regulatory Biosecurity Programmes and Other Work

In addition to implementing the RPMP, Nelson City Council undertakes a variety of pest management work for the protection of biodiversity values at high priority sites and the corridors and networks that link these sites. These programmes are largely non-regulatory (their implementation does not rely on rules in the RPMP), though the RPMP rules and Biosecurity Act 1993 provisions still apply to those pests that feature in the regulatory section of the RPMP. For instance, the 10m boundary rule for blackberry still applies on land adjacent to sites being treated for blackberry.

The work is undertaken under the auspices of Nelson Nature and Healthy Streams programmes, and programmes run by the NCC Parks team. These programmes have their own operational plans and strategies detailing their budgets and objectives for 2019-2020. Briefly; the projects for 2019-2020 are:

Dun Mountain and Upper Maitai and Roding Catchments; This site-led programme protects and enhances the unique and/or rare plant and animal species and communities in the mineral belt, limestone outcrops, and the forests of Dun Mountain and Upper Maitai and Roding catchments. Targeted pest management of 2019-2020 includes the continuing management of wilding conifers, Spanish heath, gorse and forest weeds, goats and deer. Over 2019-2020, NCC will also be investigating costs and benefits of site-based control of possums and *Vespula* (German and common wasps).

Significant Natural Areas Programme; Under the Significant Natural Areas (SNAs) Programme umbrella, there are over 160 sites that have been identified to have particularly high biodiversity value. The majority of these sites are on private land. Over 2019-2020, NCC will continue to support private landowners with advice (ad hoc or through management plans) and practical support (e.g. contractors, fencing) to reduce weed and animal pest threats. NCC also provides an environmental grants scheme which is available for landowners and community groups to apply for pest animal and weed control. The NCC Nelson Nature team will work with the NCC Parks team to develop plans and support implementation of weed, animal pest control required to protect SNAs on council lands.

Coastal Habitats; This programme protects the biodiversity values of coastal sites and species including habitats of the unique Back Beech Beetle. Over 2019-2020 NCC will continue to develop management plans and begin implementing animal pest control (trapping) to protect valuable coastal species and weed control.

Nelson Halo; Under this programme, NCC works with the Nelson community to reduce mammalian predators and improve habitat quality for native wildlife in back yards and local parks in the vicinity of the Brook Waimarama Sanctuary. The purpose of the programme is to provide sites near the sanctuary where predator numbers are low and the native vegetation is of sufficient area and quality to enable birds to successfully breed and forage, hence the 'halo'.
Over 2019-2020 the focus will be on providing support (advice, tools, traps) to community groups and residents to trap predators (rodents, mustelids, possums, cats) to achieve specific reductions in mammalian predator densities and enhance habitat quality.

Healthy Streams Pest Management; One of the objectives of the Healthy Stream initiative is to protect and enhance the aquatic biodiversity of Nelson's freshwater streams and rivers. This is achieved through a range of interventions including riparian habitat restoration. Over 2019-2020 NCC will continue to develop riparian habitat management plans which include

weed control to protect riparian plantings, including control of emerging aquatic pest plants Vietnamese Parsley and Water Celery in Stoke streams.

Bio-corridors Project: This project is a catch-all for the other support NCC provides to protect biodiversity. The ultimate aim is to link the other biodiversity protection works and projects by enhancing the physical connections between them. The focus for 2019-2020 is to identify priority corridor areas to guide support provided internally (e.g. to NCC Parks) and externally (e.g. restoration projects on private land outside of SNAs). Support includes restoration planting and weed and animal pest control to protect these areas of vegetation.

Reserve Maintenance Plans: Pest plant control is a key part of Reserve Maintenance Plans for 2019-2020 established by NCC Parks for the following reserves: Bolwell Reserve, Botanical Hill Reserve, Grampians Reserve, Hanby Park Reserve, Highview Reserve, Pipers Reserve, Sir Stanley Whitehead Reserve, Stoke Reservoir Reserve; Tantragee Reserve, Brook Conservation Reserve, Marsden Valley Reserve, Venner Reserve, Airport Peninsular Esplanade Reserve, Haulashore Island Reserve, Oyster Island Reserve, Wakapuaka River Reserve, and Wakapuaka Sandflats Esplanade Reserve. The purpose of plant pest control, target species and control targets are identified for each reserve and, following control throughout the areas, monitoring will be undertaken and results against targets reported to NCC. The Reserve Maintenance Plans will be informed by Ecological Restoration Plans currently under development.

Top of the South Marine Biosecurity Partnership: NCC is an actively involved in this partnership to manage marine biosecurity risks to the whole top of the South Island. The Partnership has a separate operational plan to cover its activities, including surveillance for Sabella (which is an eradication pest in the RPMP) and other key marine pests, an annual summer survey of boaties, and an education programme.

National biosecurity and biodiversity management leadership, coordination and strategy: NCC participates in a variety of national biosecurity management groups, including the BioManagers Group (a collective of regional council biosecurity managers), the Biosecurity Working Group (regional council biosecurity technical managers and policy developers), and the Biodiversity Working Group (regional council biodiversity technical manager and policy developers). This enables NCC to remain up-to-date with national trends and developments in pest management and biodiversity protection and policy.

5. Glossary

Active Sites / Active Site Monitoring: Sites where the pests were present in the recent past and it expected that they remain due to propagules (e.g. long-lived seeds or hard to kill corms or rhizomes) left in the soil.

Approved Management Plans: Where compliance with a rule in the RPMP can be best achieved through an ongoing management agreement, NCC may negotiate an Approved Management Plan with the Landowner/occupier concerned. An Approved Management Plan will only be used where the circumstances make it impractical to follow the specific RPMP rule; the outcomes to be achieved are the same or better and no adjoining landowner is disadvantaged.

At-risk Sites / At-risk Site Monitoring: Sites which, due to proximity to source infestations or habitat characteristics, are the most likely places for new incursions.

Authorised person: An authorised person is appointed as such under Section 103 of the Biosecurity Act 1993.

Compliance monitoring: Measurement of an infestation prior to the serving of a Notice of Direction (NOD) to an occupier, and re-measurement after the lapse period of the NOD to assess compliance with the RPMP rules.

Monitoring Sites: Sites where the pests were present in the recent past and expected to be no longer present, but with a potential risk of re-infestation due to propagules (e.g. long-lived seeds or hard to kill corms or rhizomes) left in the soil.

New Sites / New Sites Monitoring: The first record of the existence of the sites (which then progress to “active sites”).

Notice of Direction: A formal directive issue by an Authorised Person, used to enforce compliance with the RPMP.

Zero density: When no known live animals or plants of the pest species remain at the end of annual control operations in a given area, but where there is a risk of re-infestation e.g. from viable dormant seed or proximity of a mobile pest animal. Zero density has a status slightly lower than eradication and recognises potential imperfections in surveillance, monitoring and detection.