CLARENCE/WAIAU TOA BIODIVERSITY ACTION PLAN 2016 – 2021

An integrated approach to weed management, to protect the braided river habitat and biodiversity values on the Clarence/Waiau Toa.

Prepared for the Kaikōura Water Zone Committee, stakeholders and landowners to help inform and guide management decisions.

Final* – September 2017

Lake Tennyson

Mid Clarence/Waiau Toa

Upper Clarence/Waiau Toa

Broom gall mite

* Same as Draft 4

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INTRODUCTION

The Kaikōura Water Zone Committee has $100,000 per year over five years ($500,000 in total) to allocate as part of the Canterbury Water Management Strategy Immediate Steps programme. The committee has decided to allocate $250,000 over five years to the Clarence/Waiau Toa weed management programme, provided that a minimum 2/3 contribution ($500,000 over five years) is provided from other agencies and landowners.

This document is the biodiversity action plan for the Clarence/Waiau Toa weed control programme. This document is guided by the relevant goals and targets of the Canterbury Water Management Strategy (CWMS), Appendix 1. The CWMS targets and goals also form the basis of the Immediate Steps funding programme. The focus of this action plan is to set the priorities for the 'on the ground' actions occurring within the catchment and associated with

the funding available. Other biodiversity initiatives within the catchment are identified for further follow up work by the various stakeholders, however these may be implemented using alternative funding sources.

In August 2016 a meeting was held with the key stakeholders to help develop this action plan, representatives from the Department of Conservation, Fish and Game, Environment Canterbury, Marlborough District Council, Forest and Bird, Wildlife Management International, Clarence River Rafting and the Kaikōura Water Zone Committee attended the meeting and provided feedback on the draft concept. It was agreed that an annual meeting to discuss the work occurring in the catchment and next steps would be beneficial to the project.

Next Steps: The revised draft (November 2016) will be sent out to all stakeholders for further feedback. Discussions with all key landowners will occur before a final action plan is developed and distributed.

WHY A WEED CONTROL PROGRAMME?

Globally, braided rivers are naturally rare ecosystems which support specialist plant and animal communities. These communities are highly adapted towards living in this dynamic, changing physical environment. Nationally, braided rivers support high levels of endemic, threatened or at-risk species. Many of these species are either unique to the braided river environment or depend on it to complete a critical life history phase.

Within the Clarence/Waiau Toa catchment at least 100 Threatened or At Risk plant taxa have been recorded, some of which up until recently were thought to have been extinct and extinct in the wild (e.g. *Dysphania pusilla* (extinct) and *Leptinella filiformis* (extinct in the wild)). There are also multiple records of Threatened or At Risk bird (13), lizard (3), freshwater fish (10) and invertebrate (unknown number) species within the catchment. The catchment also supports a number of Originally Rare Ecosystems including; calcareous screes, boulder fields of silicic-intermediate rocks (non-volcanic), volcanic boulder fields, boulder fields of calcareous rocks, mafic cliffs, scarps and tors, braided riverbeds and limestone erosion pavements.

The Clarence/Waiau Toa has high cultural value, for Ngāti Kurī, the Waiau Toa has a whakapapa status as the parent of many other rivers in the region, including those on the far sides of the ranges. Any impact on the Waiau Toa has an impact on the rivers that are linked to it through whakapapa. The river is of immense cultural, spiritual and historical importance for Ngāti Kurī and Ngāi Tahu and figures prominently in tribal history (a summary of cultural values report is included at the end of this management plan).

In New Zealand, there are several threats to braided rivers, these include, but are not limited to: engineering works, disturbance of habitat via recreational activities (4WDs), water abstraction, introduced predators, introduced plant and algae species. The Clarence/Waiau Toa is considered one of the last remaining wild braided rivers in New Zealand due to the lack of development present. The river has a catchment area of approximately 3,200 Km^2 stretching from Lake Tennyson to the Kaikōura coast. At approximately 230 km in length it is

one of the longest and most remote catchments in New Zealand. A large proportion of the catchment is managed by the Department of Conservation, including, Molesworth Recreation Reserve, St James Conservation Area and part of Ka Whata Tu O Rakihouia Conservation Park however there are also a number of large stations including Hossack and Cloudy Range Crown Pastoral Leases, and the freehold stations; Muzzle, Bluff and Waiau Toa, as well as the smaller land holdings in the lower Clarence.

There have been no flow modification or physical changes to the hydrology and the riverbed itself. However, the key threat to the river is weed encroachment, this is because braided river weeds can: stabilise naturally dynamic braids and water channels, displace native plants, cover feeding and breeding habitat for braided river birds, provide cover for introduced mammalian predators and reduce the overall habitat quality for a variety of species. This forms the basis of the past weed control projects and the need for this action plan, which will hopefully ensure that the natural braided river character and biodiversity of the Clarence/Waiau Toa is maintained and enhanced.

INITIAL PROJECT ACTIONS: A COLLABORATIVE APPROACH

At the request of the Kaikōura Zone Water Management Committee, Environment Canterbury staff member Steve Palmer was engaged to investigate the opportunity to create an integrated weed control programme for the Clarence/Waiau Toa catchment. Over the last two years a collaborative approach to weed control within the catchment has been undertaken, with Steve Palmer facilitating the process. After undertaking aerial surveys of the entire catchment in late 2014, two key factors were immediately apparent. Firstly, 90 – 95% of the plant pest problem was confined to the main channel of the riverbed. Secondly, all landowners within the catchment were already spending large amounts of money on weed control, however there was a level of frustration regarding the timing, methodology and boundary control issues. For instance, due to definitive boundary lines, the area in which contractors and landowners were individually working was highly restrictive. As a result the control methods were not always undertaken in the most efficient way and often involved unnecessary time and expenditure.

The Immediate Steps project proposed a solution around these barriers to effective weed control operations. The additional funding allowed effective control operations to be undertaken irrespective of property boundaries, with Immediate Steps funding ensuring control measures occurred within the ‘grey areas’ previously overlooked. To date, $260,000 has been committed to weed control work in the Clarence/Waiau toa since 2014, with $148,000 from Immediate Steps. The Clarence/Waiau Toa weed control programme is an entirely voluntary approach, yet it has received 100% buy-in from all agencies and landowners. The approach and involvement of the Kaikōura Zone Water Management Committee has been warmly welcomed, with much positive feedback received.

In terms of achieving total weed control within the Clarence/Waiau toa catchment, several areas within the catchment are currently relatively clear of pest weeds, however specific follow-up and species specific action is required to prevent reestablishment of these species,

* Same as Draft 4

along with follow-up control for the species which have a long seed-bank establishment. It is essential to ensure that that works achieved to date are not undone in the future. All parties need to be committed to ensuring a weed-free future of the Clarence/Waiau Toa and long-term financial pledges towards weed control are required in order to ensure that the approach undertaken is not ad hoc, but instead is coordinated, timely and cost-effective for all involved.

ACTIONS

At the stakeholder meeting in August 2016, the current weed control project and the actions achieved to date and the key biodiversity values and threats to these values within the catchment were discussed. This was done in order to ensure that all parties agreed that the funding available (from all landowners and agencies) was being spent in the most effective way, to ensure that the maximum biodiversity gains are being achieved within the catchment. In summary the key values identified the braided river ecosystem in its entirety, which includes the specialist habitats associated with the Clarence/Waiau Toa (unmodified braids, wetlands, tributaries, seeps etc) and the rare species which occupy these habitats (flora and fauna).

Weed encroachment was identified as one of the greatest threats to the braided river ecosystem, habitat and species within the Clarence/Waiau Toa and therefore is the key focus of this action plan. However, additional actions (and the associated aims and outcomes) are listed below, based on the input from key stakeholders, cost effectiveness, current projects underway, collaboration and contribution to CWMS targets and goals (see Appendix 1).

- Weed control
- Braided river bird nesting success (predator control)
- Native vegetation protection and enhancement
- Wetland protection and enhancement
- Fish habitat protection and enhancement (native and sports fish (exotic))

Weed Control

Aim

To contain and where possible eradicate weeds that affect braided river biodiversity values, while not impacting on the native species present.

Outcomes

- Prevent the establishment of new weed species within the catchment
- Maintain clear areas and keep them weed free
- Progressively clear areas of key weed species, where possible working from the top of the catchment downstream
- Protection of the scenic values of the catchment (e.g. for recreation)

Next Steps

* Same as Draft 4

- Undertake a weed distribution survey to determine a base line and to ensure a targeted, strategic approach to the control operations.
- Identify key weed species to be eradicated from the catchment
- Determine the containment weed species for the catchment (to prevent further spread)
- Establish a surveillance list of high threat weed species to keep out of the catchment
- Note highly sensitive areas within the catchment (initially, by a conversation with DOC staff prior to control operations occurring, eventually via a map where sensitive sites are noted)
- Identify and map the key native species within the catchment
- Ensure that any weed control operations does not negatively impact on the native vegetation present
- Compile a booklet of invasive species in the catchment, with control methods (for landowners)
- Keep braided river bird nesting islands weed free (primarily black fronted tern sites in the upper catchment)
- Identify key areas where vector spread may occur, increase the surveillance in these areas
- Establish an online database (mapping system) where new sightings of individual plants can be noted for future control by individuals in the field
- Investigate new chemical options for use near water
- Encourage and support best practice on farm biosecurity measures
- Increase contractor communication to ensure accurate identification of species
- Support compliance with the Regional Pest Management Strategy/Plan (RPMS/RPMP)

Monitoring

- Undertake a baseline survey (as part of the weed distribution survey) to inform future monitoring (extent, species, abundance)
- Establishment of photopoints throughout the catchment
- Monitor broom gall mite spread (through photopoints)
- Effectiveness of control (percent kill of target species)

Weed Control Technical Notes

- Key species for the surveillance list include: elderberry, russell lupin, yellow lupin, alse tamarisk, blackberry (on the way to the Palmer), tree lupin, sycamore and Californian poppy
- Vector spread: Douglas fir, from the Lynton Downs Plantation
- Crack willow is the key issue in the catchment (no grey willow)
- Key species to eliminate from the catchment are: wilding conifers, hawthorn, rowan
- Wilding conifer control, is to be integrated with the Marlborough District Council through the MPI Molesworth Management Unit

* Same as Draft 4

- Control individual, isolated wilding conifers as they appear outside of the Molesworth Management Unit
- Areas 1, 2 and 4 within the catchment could be kept clear of gorse and broom, containment of broom in area 3.

Braided River Nesting Birds

Aim: protect and enhance the breeding populations and breeding success of endemic braided river nesting birds.

Outcomes

- Protect and increase the available breeding habitat area (i.e. clear gravels on islands)
- Ensure that the braided river character and nesting habitat is not lost due to weed encroachment
- Increasing populations of threatened or at risk braided river nesting birds (e.g. black fronted tern and black billed gull)

Next Steps

- Follow up with agencies in regards to the role willow trees play in protecting the road infrastructure and the feasibility of total willow control within the catchment (e.g. Landcorp, Transpower, Hurunui District Council)
- Control willow trees which are invading the breeding habitat area (working from the top of the catchment down)
- Implement and support the current predator control programme around the black fronted tern colonies in the upper reaches
- Implement and support the creation of nesting islands at the black fronted tern nesting sites
- Implement and support current black backed gull control operations near the river mouth (near the black billed gull colony)
- Prevent black backed gulls from establishing in the upper catchment
- Determine the feasibility to support and extend the annual black fronted tern survey that the Department of Conservation carries out in the upper catchment
- Manage access to minimise disturbance to nesting habitat during the breeding season
- Establish signage to alert river users to the birds and nesting habitat (e.g. 4wd access and dog access)

* Same as Draft 4

Native Vegetation Protection and enhancement

Aim: protect and enhance the existing native vegetation present, particularly endemic threatened plant species.

Outcomes

- Healthy, regenerating areas of native vegetation cover
- Protection and enhancement of threatened plant species

Next Steps

- Identify key habitat and map known threatened and at risk species populations within the catchment (to ensure no accidental by-kill occurs)
- Select key areas for revegetation trials
- Promote active seed source collection from within the catchment
- Where necessary, ensure protection measures (e.g. cages) are implemented to protect threatened plants from browsing and promote landscape scale control of key browsers

Wetland protection and enhancement

Aim: Protection, enhancement and no net loss of wetland area within the catchment.

Outcomes

- Native wetland values (flora and fauna) are maintained and/or enhanced
- Native, healthy, intact, functioning wetland ecosystems

Next Steps

- Collate all the wetland information currently available (e.g. Environment Canterbury Scientists, Department of Conservation reports, John Preece wetland report, Molesworth Management Plan)
- Create an inventory of wetlands within the catchment
- Identify the key values and threats of each significant wetland within the catchment
- Establish wetland monitoring where and if required
- Explore possible protection and enhancement options specific to the key threats and values of each wetland

* Same as Draft 4

Fish habitat protection and enhancement (native and sports fish (exotic))

Aim: To protect and enhance the habitats (and populations) of threatened native fish.

Outcomes

- Ensure healthy populations of native fish are protected
- Protect and enhance the habitat for any populations of endemic, threatened, at-risk freshwater species
- Protection of spawning habitat for native and sports fish

Next Steps

- Collate existing information on native and exotic fish populations, distribution and spawning habitat (DOC surveys and reports, NZFFD, F&G)
- Explore options for instream habitat enhancement (where and if required)
- Identify areas where natural or artificial fish barriers exist, determine if these are working effectively to prevent predation between species
- Identify areas which would benefit from the installation or remediation of fish barriers
- Identify and ensure areas which are currently trout free (e.g. Lake Mc Rae) are maintained
- Ensure that the flow and abstraction from the river remains relatively unchanged and does not prevent fish passage for native or exotic species.
- Discourage long-fin eel fishing within the catchment

SUMMARY

These aims, outcomes and next steps where possible will help inform the next steps in the weed control operations undertaken with the landowners and key agencies within the catchment. The additional biodiversity aims and outcomes will also be investigated as resources allow. An annual meeting between all agencies and landowners will help review these outcomes as required and note the actions undertaken to date.

* Same as Draft 4

Te Rūnanga o Kaikōura Inc

SUMMARY OF CULTURAL VALUES

"Ko Waiau toa te awa"

Te Rūnanga o Kaikōura highly commends the work of the Kaikōura Zone Committee, Ecan, all relevant agencies and landowners for the work done to date in working collaboratively to eradicate and control weeds along our beautiful Waiau Toa. We hope that others are inspired to do the same in their areas for the benefit of our future generations. This project will provide an opportunity for the native flora and fauna to flourish.

Te Rūnanga o Kaikōura would like to share some of our views and values with you. They are recorded in Te Poha o Tohu Raumati our Iwi Management Plan (IMP), available on the Kaikōura, Ecan councils and Te Rūnanga o Ngāi Tahu websites. This plan gives a good account of who we are and what we value.

There is a specific section in Te Pōhā o Tohu Raumati titled 'Waiau toa' which describes our issues and policies associated with the lands, waters, mahinga kai and biodiversity of the Waiau toa catchment.

For Ngāti Kurī, the Waiau toa has a whakapapa status as the parent of many other rivers in the region, including those on the far sides of the ranges. Any impact on the Waiau toa has an impact on the rivers that are linked to it through whakapapa. The river is of immense cultural, spiritual and historical importance for Ngāti Kurī and Ngāi Tahu and figures prominently in tribal history.

We both whakapapa to and mihi to water. This is done in recognition of and respect for our connection to water. From a non-Māori point of view, this could be seen in terms of the human body and the fact that it's made up of mostly water. It means that we have an inherited relationship with and a physical connection to water. Waterways have a special place in our heart. They connect the mountains to the sea, they are the lifeblood of Papatūānuku, they have mana and a life presence of their own. We believe that rivers should be treated with total respect and their health given the utmost priority.

Ki uta ki tai - from the Mountains to the Sea

Is a philosophy used by us to describe an overall approach to natural resource management. It is an indigenous understanding of the environment that can be used to help address the wide range of issues we face with regard to environmental management. Ki uta ki tai is based on the idea that if the realms of Tāwhirimātea, Tāne, Papatūānuku and Tangaroa are

sustained, then the people will be sustained. The philosophy reflects the knowledge that resources are connected, from the mountains to the sea, and must be managed as such.

Recognizing the cultural landscape

Cultural landscapes are places that are of special importance to our Hapū. Because of whakapapa, Mahinga kai, historical, spiritual and other cultural associations. Virtually all parts of the takiwā have cultural landscape qualities and can be identified as special for one or more reasons.

Mahinga kai

The food, the gathering, the places and the ability to pass on knowledge to the next generation are the key things underpinning this value. Mahinga kai is a way of life based on hunting and gathering, sustenance and survival. Kaikōura was renowned for its resources in much the same way as it is today. Seasonal hunting parties often travelled and camped in the same areas depending on the supply and availability of resources. The ability to hand this knowledge to the next generation is a fundamental principle of survival. Today many of these areas are now not available to us. However we advocate for the protection and enhancement of all waterways knowing that their connections to other waterways and landscapes provide a vital and equally important link.

Indigenous biodiversity

We love our indigenous species, from the minute micro-fauna in soils and water to tiny invertebrates to the largest animals on land and in air, we value them all. We also respect how each is dependent on the other for survival. We are strong advocates for productive and healthy riparian margins and wetlands. Like rivers are the “arteries” of Papatūānuku, wetlands and riparian margins are the “kidneys” and play a very important function as environmental infrastructure, such as filtering, flow and flood management, bank stabilization and species habitat. Importantly they are key biodiversity nodes that provide a valuable link for native corridors from the mountains to the sea – ki uta ki tai.

Wai/Water

Clean, plentiful, shared, recognized and respected is what we advocate for water. Water quality, quantity, flows (surface and subsurface) and river mouths are valued. Land-use, wetlands, riparian margins and coastal processes are recognized as key influences on these values.

Chemicals

Organics will always be our first option. Building the soils without the use of chemicals will always be something we aspire to. We recognize that in some circumstances chemicals may be used. We may support approved and appropriately applied chemicals (securely stored) in some circumstances. We expect that all weed control will avoid adverse impacts on mahinga kai species or to areas of cultural significance, ie Waiau toa. In respect of this Immediate Steps application we understand that chemicals used near any waterways will be spot sprayed

directly on to the plant as safely as possible to avoid spraying directly into the Waiau toa. Helicopter spraying will not occur near waterways.

Appendix 1: CWMS Goals and Targets

Below is a copy of the relevant biodiversity targets and goals set out in the Canterbury Water Management Strategy, relevant to braided river ecosystems such as the Clarence/Waiau Toa. The full document can be found at: http://ecan.govt.nz/publications/Plans/cw-canterbury-water-wanagement-strategy-05-11-09.pdf

2. Natural character, processes and ecological health of braided rivers

Braided rivers are a defining characteristic of Canterbury's biodiversity and landscapes. The seven alpine rivers that contribute 88% of the flow within the region - Clarence, Waiau, Hurunui, Waimakariri, Rakaia, Rangitata, Waitaki – are all braided. Other foothill rivers are braided or have braided reaches. The beds, riparian wetland/springs, riparian margins and floodplains of braided rivers support many of the regions endangered and rare species – birds, plants, fish, lizards and insects.

The flow of sediment and river bed material is critical to the braided nature of these rivers, so making sure the bed and floodplains are reworked by floods at close to a natural frequency is important. Similarly water quality is a key feature of a braided river. In addition, to control of water flows and water quality there is a need to manage gravel extraction weed control, land-use on the floodplains and river control works because these are also key influences on the state of braided rivers. The Immediate Steps Protection and Restoration Programme outlined in Annex I recommends weed and pest control, management of vehicle use and other bed disturbances, and stock exclusion as priority actions for braided rivers.

Goals

From 2010:

- Maintain the braided character of all Canterbury's braided rivers by
- Maintaining the upper catchments of Canterbury's alpine braided rivers as largely natural ecosystems and landscapes
- No new dams on the mainstem of major alpine braided rivers
- Maintaining the extent of active floodplains, flow variability and sediment flow processes including when undertaking river protection works, land-use change or deliberate vegetation stabilisation
- Supporting the dynamics of river mouths and coastal processes
- Implement actions to correct the decline in useable braided river bird habitat.

By 2015:

- Identified where environmental flows do not include flood peaks, flow variability, flood periodicity, and channel forming flows and implemented actions to rectify
- Protected the indigenous habitats in riparian wetlands, springs and the lagoons associated with braided rivers
- Enhanced and protected of breeding population of indigenous braided river birds.

(Note restoration of lowland streams covered under biodiversity)

* Same as Draft 4

By 2020:

- Protected significant habitat for a full range of indigenous braided river flora and fauna Protected and enhanced the habitats in riparian wetlands, springs and the lagoons associated with braided rivers
- Made progress towards achieving environmental flows.

By 2040:

- Achieved all environmental flows
- Canterbury's braided rivers show the dynamic, braided nature typical of such rivers
- All indigenous braided river-dependent species are showing positive trends in abundance and health Increase habitat area usable by all species of braided river indigenous birds.

Appendix 2: The Clarence/Waiau Toa catchment and weed control areas

For past weed control operations, the Clarence/Waiau Toa catchment has been split into four distinct areas (Map 1). This is based on the pest plant density present, the Land tenure, respective Territorial Authority and access. The four areas are:

Area 1…….State Highway 1 to the Dart Stream

Area 2…….Dart Stream to the Gore Stream

Area 3…….Gore Stream to the St James Homestead

Area 4…….St James Homestead to Lake Tennyson

The four areas within the catchment are quite different in terms of their plant pest issues, this is primarily driven by accessibility to the public and farming intensity. Map 2 illustrates the weed control operations carried out over the last two years in the catchment. The difference between the four areas and a brief description of the control works carried out to date is described below.

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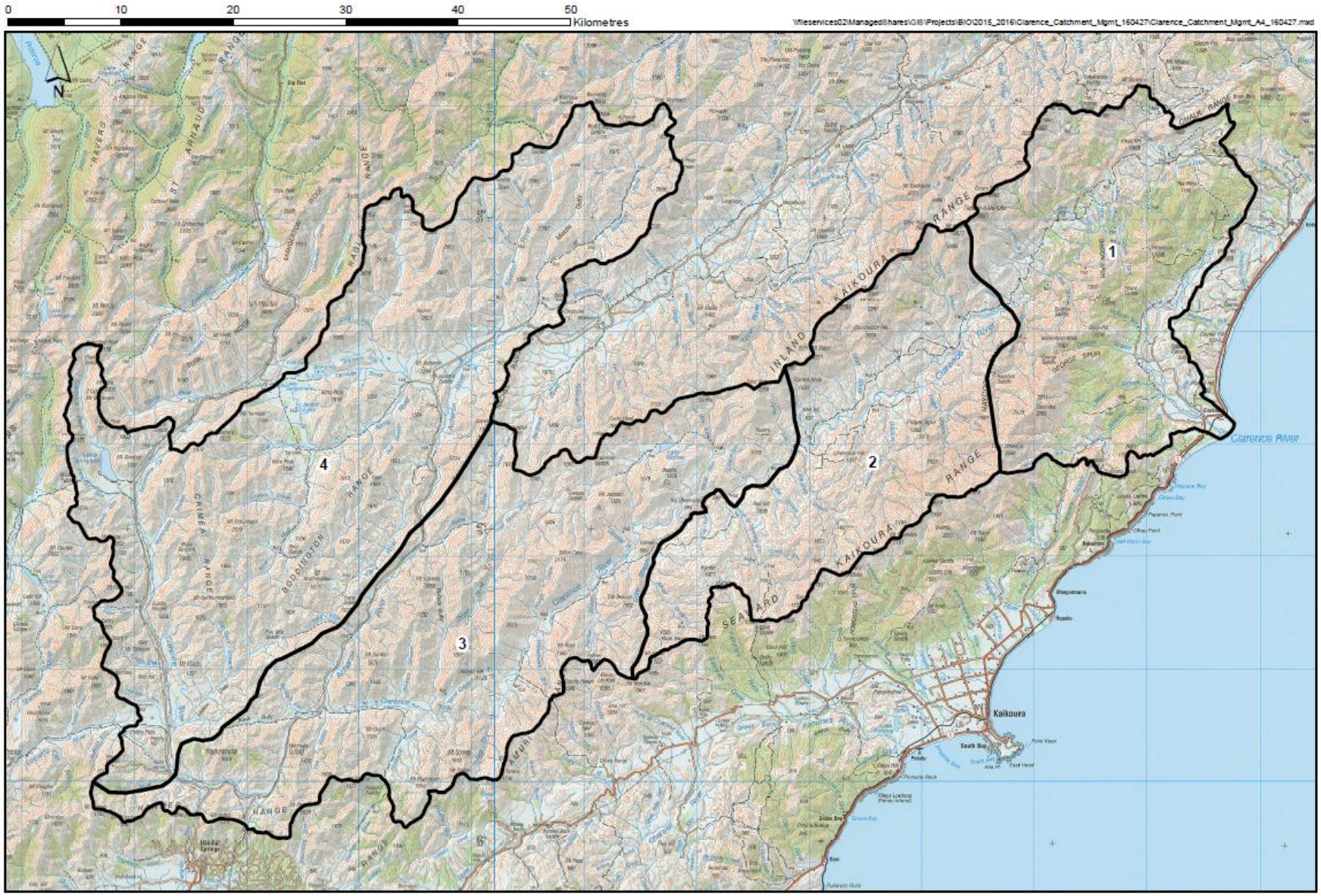
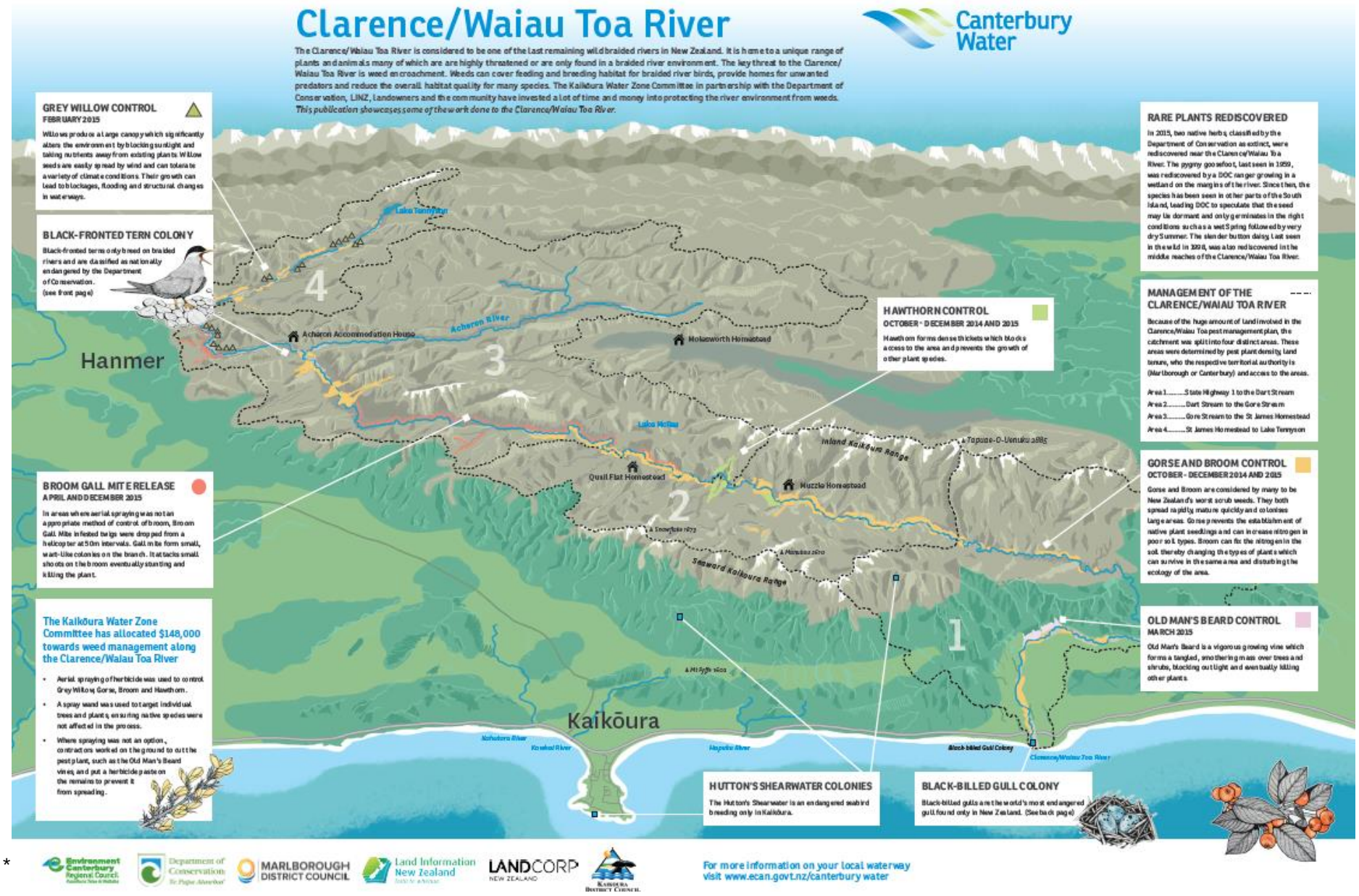


* Sa Map 1. Illustrating the four areas of the Clarence/Waiau Toa catchment.

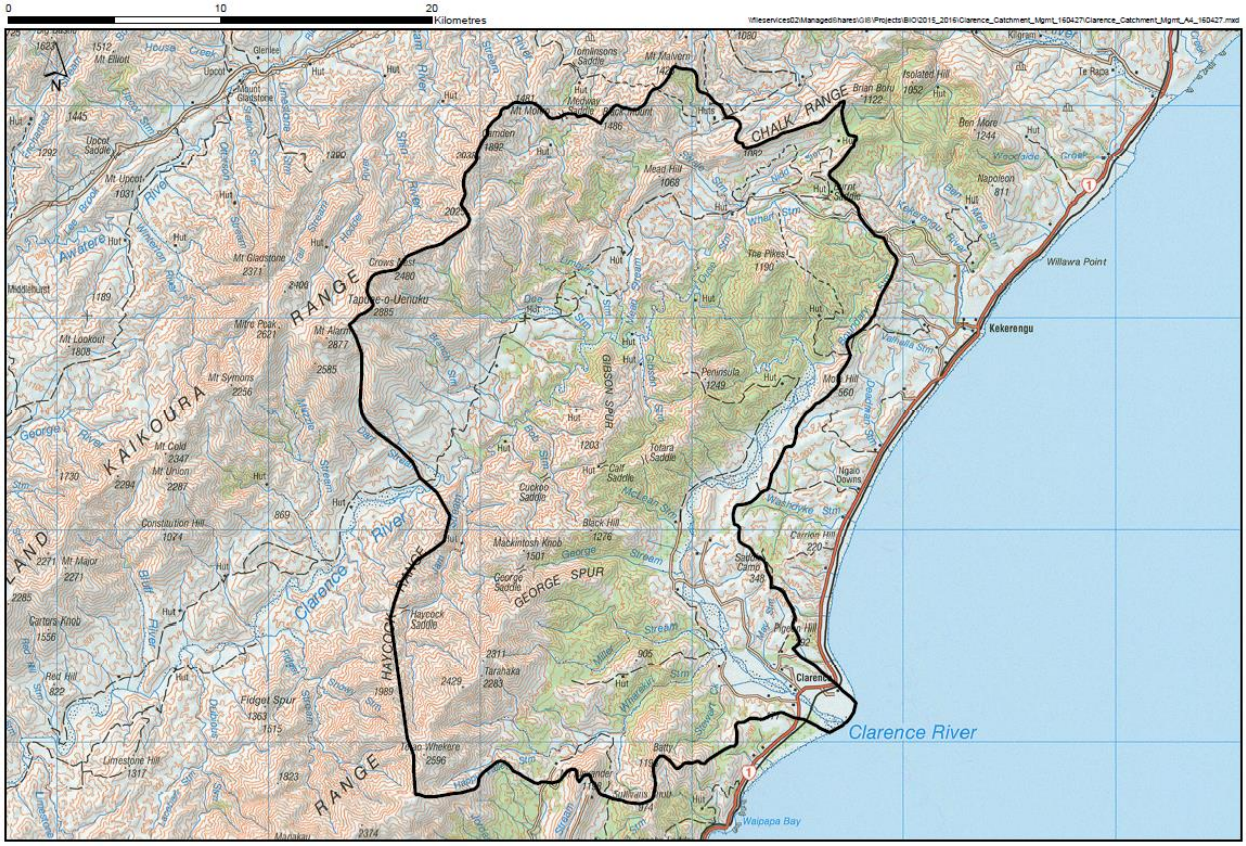


Map 2. Infographic prepared for the Kaikōura Water Zone Committee which gives an overview of the four areas of the Clarence/Waiau Toa catchment and the weed control operations which have been undertaken to date.

Area 1…….State Highway 1 to the Dart Stream

Area 1 is the most intensively farmed out of the four areas and has the highest level of human activity. As a result of this increased human activity, there are a wide range of plant pest species present compared to the other areas. However, it also contains a number of very important biodiversity sites (including rare ecosystems, threatened and at risk species) both on private and public conservation land. The dominant plant pests present are, Old Man's Beard, buddleia, contoneaster, gorse, broom and nasella tussock. However, despite this higher weed diversity there is a lower infestation and density level throughout this area.

The weed distribution map and recommended methods of control (and key species to target) will be extremely useful for this area.



Map 3: Close-up Map of Area 1 on the Clarence/Waiau Toa.

Photo 1: Fairly clear riverbed, any gorse or broom would be highly visible when in flower (Nov/Dec).

Photo 2: The gorge.

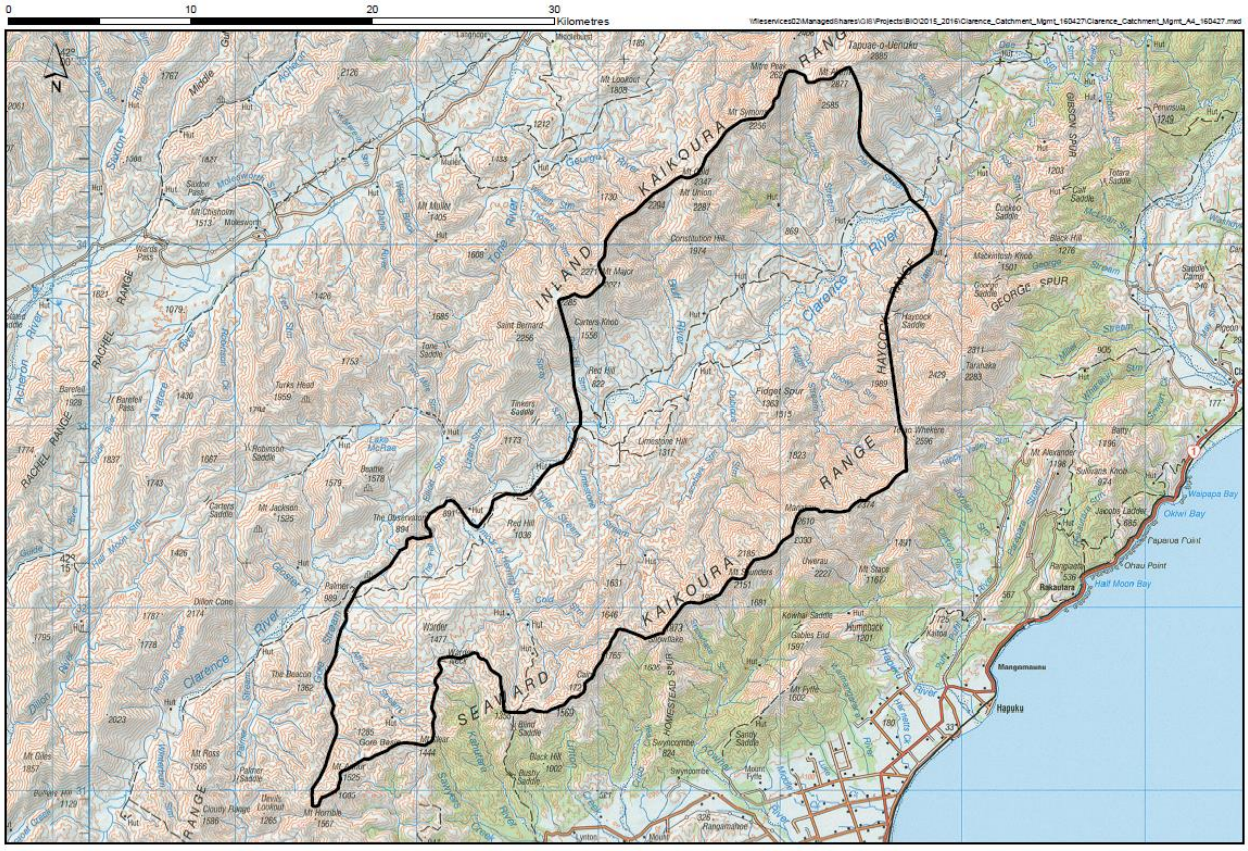
Photo 3: Coming out of the gorge with Tapuae-o-Uenuku in the background.

Area 2…….Dart Stream to the Gore Stream

Area 2 is more remote than Area 1 and the level of human activity is greatly reduced. As a result of this, the variety of plant pests is also reduced. However, the density of these plants is greatly increased. In particular, gorse and broom plants are moderately prevalent within Area 2.

Scattered gorse and broom is present throughout the area, and some extra work is required to control these plants. Once again, follow-up control is also required to prevent the re-establishment of gorse and broom. An area of hawthorn and a small pocket of false tamarisk have been controlled within Area 2. These sites need follow up to ensure these species are controlled and eventually eliminated. There are large areas of public conservation land which contain a range of representative and rare ecosystems and species. Together with Area 3 this is one of the driest areas in South Marlborough.

A long-term, concerted, co-ordinated control programme across the properties within this area would enable total control within the riverbed. Follow-up control of missed plants or new plants arising from the seed bank is the key issue for future years.



Map 4: Close-up Map of Area 2 on the Clarence/Waiau Toa.

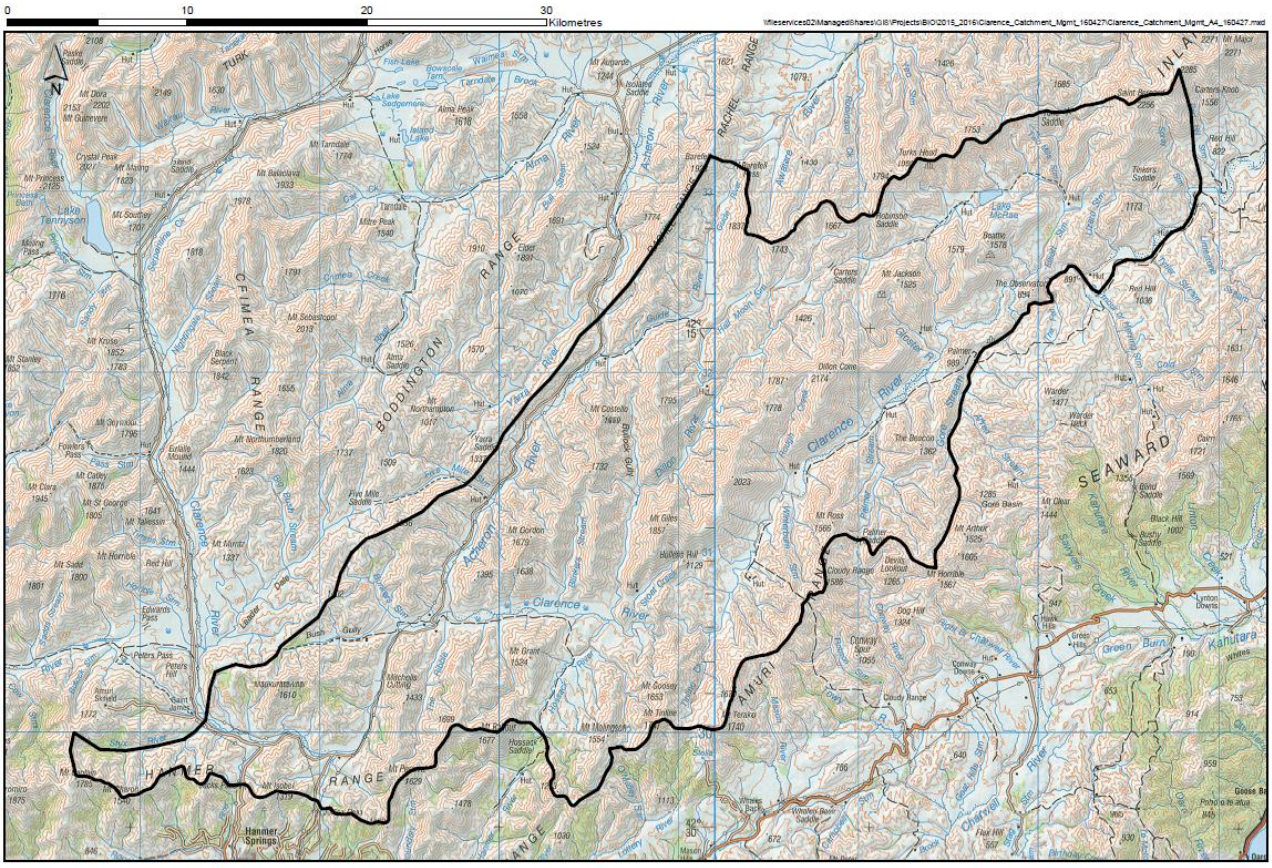
Photo 4: The start of Area 2, willows in the riverbed.

Photo 5: The Ravine at the top right of photo. Broom (in particular) becomes more apparent from this point (upstream).

Photo 6: One of the more extensive patches of broom observed. Horse Flat on the left (scattered broom, now controlled).

Area 3…….Gore Stream to the St James Homestead

Area 3 has the most extensive infestations of broom, gorse and wilding conifers as well as scattered rowan. The productivity of this area is minimal and vehicle access is restricted. The cost of major chemical control is not feasible across the whole area. Some site-led containment control is being undertaken, particularly at the Black Fronted Tern nesting habitat, where weed invasion onto the nesting sites severely impacts the reproductive success and survival of these birds. The Broom Gall Mite biocontrol agent has been released within Area 3 and has already shown a rapid spread throughout the area.



Map 5: Close-up Map of Area 3 on the Clarence/Waiau Toa.

Wilding conifers

Wilding conifers are a huge threat to the Clarence/Waiau Toa catchment and are the main pest plant threat in Area 3. The dollar value required to control the wilding conifers currently present is beyond the scope of this project and the Immediate Steps Funding available. However, in 2016 MPI approved 4 years funding for wilding conifer control in the sparse areas of an operational unit called Molesworth which includes this area and Area 4. Recently the South Marlborough Landscape Restoration Trust has been formed, with their southern boundary including the majority of the Clarence/Waiau Toa catchment. This trust has been formed to address the wilding conifer issue in South Marlborough and intends to apply for alternative funding.

In addition to the MPI funding Area 3 and 4 were part of an existing wilding conifer project led by Department of Conservation and following a comprehensive operational plan. At the time of writing this strategy there was still insufficient funds to tackle all the dense infestations within the Clarence/Waiau Toa catchment.

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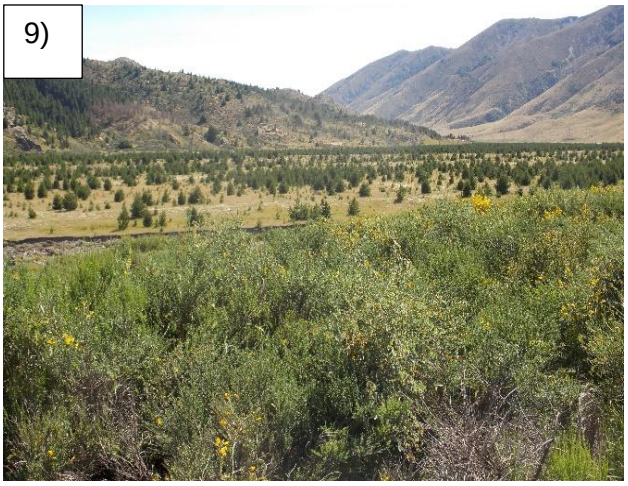

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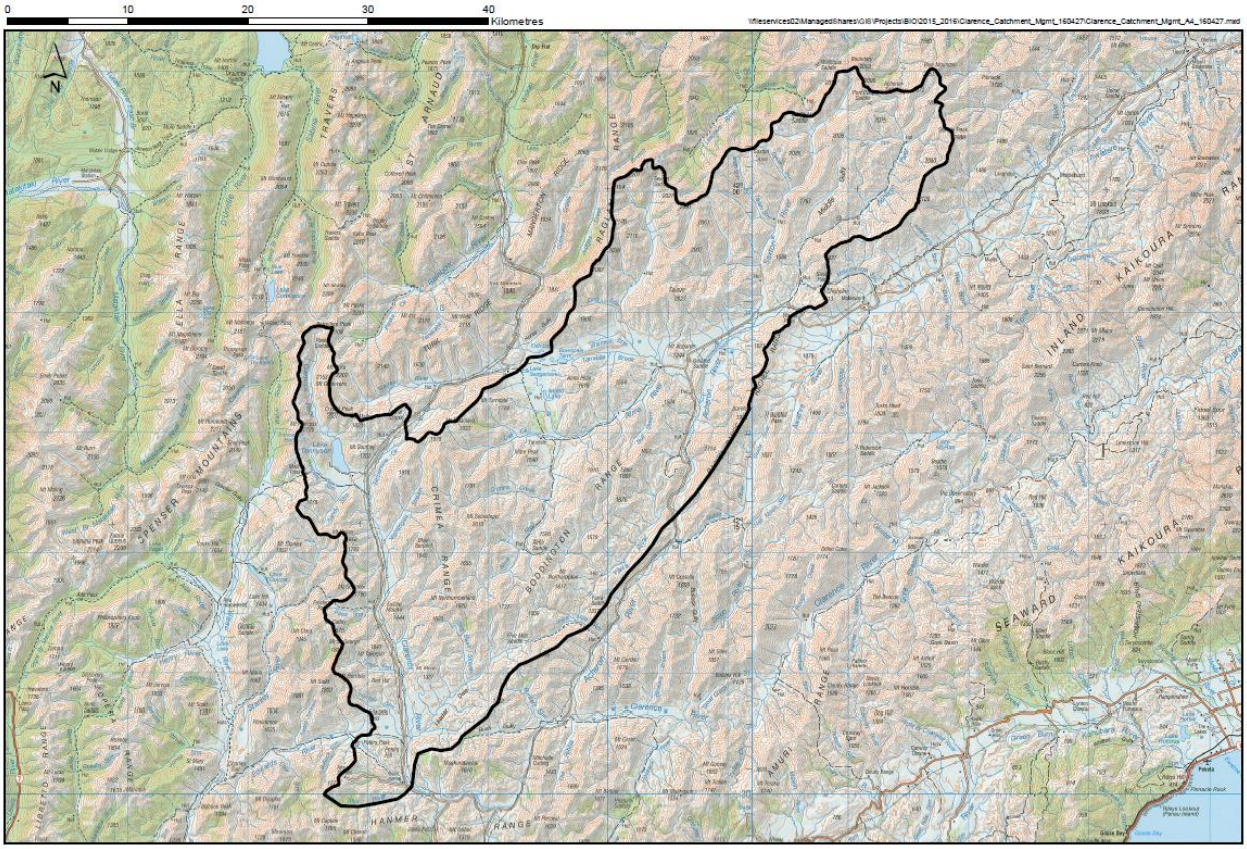
Photo 7: broom in flower in Area 3; Photo 8: broom gall mite, well established; Photo 9: wilding conifers in Area 3; Photo 10: wilding conifer spray trail in Area 3.

Area 4…….St James Homestead to Lake Tennyson

In stark contrast to Area 3, Area 4 is relatively clear and pristine with large areas of open river bed and tussock flats in the main Clarence river bed. However there is a major wilding conifer infestation around the Tarndale Flats. Area 4 is also part of the MPI Molesworth wilding conifer project which is addressing the sparse infestations.

Some scattered gorse and broom plants are present in low numbers within Area 4. These have mostly all been controlled in the earlier control operations. Continued monitoring of this area is recommended, to control any new isolated plants which arise and also to control any small plants which may have previously been missed. The road corridors through this area pose a biosecurity risk as so surveillance will always be required and an important component of Area 4 management.



Map 6: Close-up Map of Area 4 on the Clarence/Waiau Toa.

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12)

Photo 11: Lake Tennyson; Photo 12: Upper Clarence/Waiau Toa.

Appendix 3: Overview of the key plant pests within the Clarence/Waiau Toa

An overview of the plant description, pest nature and method of spread for each pest plant species present throughout the Clarence/Waiau Toa is detailed below*.

BROOM

Block broom infestation – R. McCaw

Description: Erect, branched, almost leafless, deciduous shrub up to 2.5m in height with a woody rootstock. Pea-like flowers (15-25mm) are produced from September to April and are followed by oblong green pods (30-60mm) that turn black.

Why it's a problem: Broom is a prolific seeder which spreads rapidly, matures quickly and colonises large areas, forming pure stands that dominate habitats. It is a legume, fixing nitrogen in the soil and altering the community composition of areas.

Spread by: Explosive seed mechanism spreads seed 1-5m from the parent plant. Seed is also spread by machinery, soil and water movement and possibly birds and feral pigs.

GORSE

Block and scattered gorse on hillside – R. McCaw

Description: Sharply spiny shrub up to 2-3m in height with woody erect spreading, branched stems. Pea-like yellow flowers (13-20mm long) appear from May to November (occasionally all year round), followed by hairy seed pods (13-25mm long) which turn black when mature.

Why it's a problem: Produces massive numbers of long-lived seeds, matures and grows rapidly, and will grow in a range of habitats. Will often forms monocultures, inhibiting the establishment of native plant seedlings and increasing the nitrogen in poor soil types, altering plant communities.

Spread by: Explosion of seed pods spreads seed up to 5m from the parent plant, and seed is also spread by soil movement and road graders, contaminated machinery, animals, boots, stock food and lime.

* Photo and Information Credit: *Plant Descriptions, Why it's a problem and Spread by information sourced from Weedbusters and Environment Canterbury Weed of the Months or Canterbury Regional Pest Management Strategy. Alder information sourced from Auckland Regional Council.*

NASSELLA TUSSOCK

Description: Flower heads (panicles) are purple and carried on slender stalks from October to December. Panicles erect when young and droop over leaves when mature. Leaves feel rough when rubbed from tip to base. Stem bases are whitish and separate easily like shallots. When squeezed, the base feels very hard.

Left: Nassella in seed – G.Livingstone
Right: Nassella roots – Environment Canterbury

Why it's a problem: Nassella tussock is unpalatable to stock. If not controlled, shading caused by nassella's drooping foliage and overgrazing of other species soon result in displacement of palatable pasture plants. Nassella tussock is extremely adaptable and grows in a wide range of habitats. It will displace other plant species, however in general it is an agricultural pest rather than a biodiversity pest.

Spread by: wind, water, carried via animals, people (on clothing), machinery and agricultural seed.

OLD MAN'S BEARD

Seeding Old man's beard in tree canopy – M. vonTippleskirch

Description: Leaves can vary from serrated, oval, heart or lance-shaped. The stems are opposite each other on vine. Five leaflets per stem. (Other clematis species generally have three leaflets). White/greenish to yellow/white in colour flowers December through to April. Young vines are ribbed and often purple in colour. Older vines are woody, often grey/brown in colour. Sets fluffy white seeds around April.

Why it's a problem: Old man's beard is a vigorous growing vine which forms a tangled smothering mass over trees and shrubs, blocking out light and eventually killing supporting plants.

Spread by: wind, people, stock and machinery.

HAWTHORN

Hawthorn invasion- T. Broughton

Description: Small deciduous tree, up to 10m in height. White or red-pink flowers with five petals grow in clusters and occur in spring (October/November). The fruit are small (7-11mm diameter), almost round, dark red berries, with a single woody seed (nutlet) inside.

Why it's a problem: Hawthorn forms dense thickets, blocking access, crowding out other plant species and preventing desirable seedlings from establishing.

Spread by: Birds, water, people and equipment.

BUDDLEIA

Description: Deciduous shrub 1-5m tall. Four-sided branches. Leaves are 10 to 30cm, dark green on top, pale with white downy hairs underneath. The 30cm flower heads are made up of small scented flowers from December to February. The flowers are usually pale purple with an orange centre, but can range from white to crimson.

Buddleia davidii flower – C. Howell

Why it's a problem: Buddleia grows quickly and produces lots of windborne seed. It can tolerate extreme conditions, particularly poor soil and readily forms dense infestations. It is a serious weed in braided riverbeds as it can change the water flows and displace other vegetation. Buddleia is also a problem for forestry industry as it out-competes young seedlings.

Spread by: wind, water, people, and machinery.

WILDING CONIFERS

Wilding conifers – Environment Canterbury

Description: Conifers are evergreen trees that can grow up to 25m in height. Leaves need-like and green, cones are produced with many seeds. Contorta pine, corsican pine, douglas fir, radiata pine, larch, scots pine and mountain pine are the most widespread species.

Why it's a problem: Wilding conifers obscure scenic views, decrease production of pastoral farms, increase the risk of fire, reduce stream water yield in flow sensitive catchments, displace native communities and impact on cultural and historic values.

Spread by: Wind, people.

SWEET BRIAR

Sweet briar invasion – C.Lewis

Description: Rose plant, a deciduous, erect, woody shrub 3-5m in height, with stout branched roots that often sucker. Many arching stems grow from the base, with unequal, flattened, downward- pointing, curved thorns. Apple-smelling leaves are hairless and dull-green above, hairy underneath and divided into 5-9 narrow-oval leaflets. Clusters of 1-3 pink (or bright pink with whitish base) rose-like, 5-petalled flowers from November to January, followed by prominent, oval, shiny red or orange-red rose hips from February to May.

Why it's a problem: Briar forms dense, long-lived stands in tough, open habitats. It can be a nurse crop for native species if there is a nearby seed-source. Briar can alter riverbeds, causing flooding. Requires moderate to high light levels, and invades open sites or degraded forest habitat.

SPREAD BY: Pigs, cattle, deer, birds and suckering.

COTONESTER

Cotonester fruit – Environment Canterbury

Description: A spreading evergreen shrub or small tree. Leaves are alternate and usually arranged in two rows. Young shoots are hairy, with young leaves hairy underneath. Flowers are small, white-pink, from late spring to early summer. The berries are orange-red to scarlet and present from summer through to winter.

Why it's a problem: Cotoneaster species form dense stands, out-competing desirable plant species. Cotoneaster is tolerant of a wide range of conditions including drought, damp, hot, cold, salt and shade. It is long-lived and produces lots of highly viable seed.

Spread by: Birds.

ROWAN

Description: A tree that grows up to 12m in height. Its leaves are divided into pairs of leaflets (up to 8) plus a terminal leaflet. Large clusters of white flowers are seen October to November. Deep orange berries (range from pink to red) from January to April. Deciduous, the leaves turn golden in autumn.

Rowan in flower – C Howell

Why it's a problem: Rowan grows quickly and tolerates a wide range of conditions, outcompeting native species. It grows in many parts of New Zealand from the coast to 1000m in altitude. Habitat ranges from open areas through to disturbed forest. It spreads easily as the fruits are widely dispersed by birds. It is a particular problem in the high country open tussock land, where it thrives.

SPREAD: Birds.

ALDER

Left: Alder male and female catkins – Auckland Regional Council
Right: Alder leaf – Auckland Regional Council

Description: European (Black) Alder is a quick growing, short lived medium sized tree. It can grow up to 30m in height. 10cm long leaves are rounded with wavy serrated margins and short stalks. The upper leaf surface is a glossy dark green with a paler green underside and rusty-brown hairs in the angle of the veins. Alder is diecious having separate male and female catkins that form in autumn. Male catkin are small (5-10cm long) pendulous, red in colour and cone-like. Female catkins are upright, green and broad with short stalks. The young trees have smooth, glossy and greenish-brown coloured bark, while the bark of older trees is fishered and dark grey. Branches are smooth, sticky and scattered with resinous warts. Seeds are flattened reddish-brown nuts edged with webbing and filled with pockets of air.

Why it's a problem: Alder is a fast growing tree that can quickly form dense monoculture stands. These stands can inhibit the growth of native plants. Its deep roots and ability to fix atmospheric nitrogen enable it to grow in dry nutrient-poor soils. The annual accumulation of alder leaf litter increases the availability of phosphorus in the ground. Alders dense network of roots can cause increased sedimentation in pools and waterways. *A. glutinosa* is classed as an environmental weed in New Zealand.

Spread: Wind, birds, water, suckering and vegetative spread from logs and fallen branches.

BARBERRY

Description: An evergreen or semi-deciduous shrub that grows 2-3m in height. It produces many small, yellow, drooping flowers up to 6cm long from October to November. Small, purplish, oblong berries (7-12mm long), with a white bloom are present between March and May. The main stems have yellowish-grey bark with sharp spines that are single or three-pronged, up to 2cm long.

Barberry – Environment Canterbury

Why it's a problem: Common barberry lives for a long time, producing long-lasting, well-dispersed seeds. It is able to tolerate damp to dry conditions, high wind, salt, a range of soil types and is unpalatable to stock. It can outcompete and replace native species in open habitats.

Spread: Birds.

VARIGATED THISTLE

Description: A robust erect annual that grows up to 2.5m in height with stout flowering stems. Stems are hollow and branched from the base. Glossy rosette leaves have white veins and blotches giving it a variegated look. In summer, large purple flowers are surrounded by many sharp spines.

Why it's a problem: The plant can form dense stands up to 150,000 plants per hectare. Mature thistles can produce 10,000 seeds per plant with 60-80% germination viability, the seed may survive in the soil for long periods.

Spread: wind, water, stock, machinery.

Left: Flower with spikes - Environment Canterbury.
Right: Thistle rosette leaves - Environment Canterbury

CRACK WILLOW

Description: Deciduous tree up to 25m in height, with spreading branches. Long and thin leaves, silky when young and hairless when mature. Narrow downward curving catkins.

Why it's a problem: Forms dense thickets by suckering and stem fragments sprouting. Tolerates flooding, hot and cold temperatures, and semi-shade. It produces a canopy, significantly changing the environment for the existing species. It's vigorous growth and spread leads to blockages, flooding and structural changes in waterways and in particular wetlands it can overtop and shade out native vegetation.

Spread by: Stem fragments, local spread, and machinery.

TREE LUPIN

Description: Short-lived perennial shrub, with branching stems and pale yellow flowers from October to May, followed by seed pods.

Why it's a problem: Lupins are fast growing and produce lots of long lived seeds. They tolerate a wide range of environmental conditions and can readily establish in riverbeds, confining riverbed gravels and building up gravel and altering the natural braid plain.

Spread: pod explosion, water.

FALSE TAMARISK

Description: Deciduous shrub with upright branches and narrow triangular leaves. Small pink clustered flowers around January followed by grey capsules.

Why it's a problem: Alters the natural character of river beds.

Spread: wind, water.

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[4] Photo and Information Credit: *Plant Descriptions, Why it's a problem and Spread by information sourced from Weedbusters and Environment Canterbury Weed of the Months or Canterbury Regional Pest Management Strategy. Alder information sourced from Auckland Regional Council.*

Appendix 4: Clarence/Waiau Toa Biodiversity Information and Immediate Steps Projects

Freshwater Values

Gobiomorphus alpinus (Tarndale Bully)

Within the Clarence/Waiau Toa catchment, at least ten native fish species are classified as Threatened or At Risk. The New Zealand Freshwater Fish Database shows, shortjaw kōkopu (Nationally Vulnerable), banded kōkopu (not threatened), inanga (At Risk - Declining), torrent fish (At Risk - Declining), blue gill bully (At Risk - Declining), northern flat-head galaxiid (Nationally Vulnerable), koaro (At Risk – Declining), upland bully (not threatened), longfin eel (At Risk – Declining) and the shortfin eel (not threatened). The catchment also contains a number of lakes with significant native fish populations in the absence of trout. One freshwater fish species, the Tarndale Bully (*Gobiomorphus alpinus*) is endemic to Molesworth, this species has only been found in the Sedgemere/Tarndale lakes, the majority of which flow into the Alma (and one lake flowing into the Wairau). The lakes are also significant in that they are dominated by native aquatic weeds and do not have the major invasive species. These lakes also have significant wetlands associated with their margins containing a large number of Threatened and At Risk plant species. These lakes are also important for water fowl and species such as Australian Crested Grebe.

Braided River Birds

The Clarence/Waiau Toa has been identified by Forest and Bird as an IBA (Important Bird and Biodiversity Area) for New Zealand Seabirds. The river has been assigned an A1 status, which identifies that the Clarence catchment contains “More than threshold numbers of one or more globally threatened species”[1]. This is due to the presence of the Black-billed Gull (Nationally Critical) and the Black-fronted Tern (Nationally Endangered). The report also identifies many additional species which are confirmed or likely to be breeding within the catchment, these are: Canadian Goose, Mallard, Grey Duck, Australasian Harrier, NZ Falcon (Nationally Vulnerable), South Island Pied Oystercatcher (Declining), Pied Stilt (Declining), Banded Dotterel (Nationally Vulnerable), Spur-winged Plover, Southern Black-backed Gull, NZ Kingfisher, Welcome Swallow, NZ Pipit, Grey Warbler, Silvereye, Skylark, Blackbird, Song Thrush, Yellowhammer, Chaffinch, Greenfinch, Goldfinch, Redpoll, House Sparrow, Starling, Australian Magpie. Additionally, the Hutton’s shearwater (Declining) is endemic to the Kaikōura region and of high local significance. The two remaining colonies are restricted to the alpine zone of the Seaward Kaikōura Range. One of these colonies, falls just within the Clarence catchment, on private land at Shearwater Stream, under QEII covenant and has approximately 8,000 pairs. The larger colony at the headwaters of the Kowhai River (Uerau Nature Reserve) contains approximately 106,000 pairs. The Hutton’s Shearwater Charitable Trust is partnered with the Department of Conservation to undertake predator control at the colony sites and monitor the wild populations, along with several additional outcomes[3].

The Kaikōura Zone Water Management Committee is helping fund a four year biodiversity project that will adaptively manage and protect the black-billed gull population on the Clarence/Waiau Toa, which nest near the mouth of the river. In recent years the population has been monitored via remote video cameras and aerial predators have been identified as the key reason for extremely low breeding success (chick survival) within this colony. The project aims to address aerial predation issues (black backed gulls), which are a key threat to this black-billed gull colony and provide management recommendations for other black-billed gull colonies throughout Canterbury and New Zealand, currently, there is very little knowledge about how to manage these nationally vulnerable and rapidly declining species on our braided rivers. This project will also help the red-billed gulls and white -fronted tern populations which nest within the same area and have been also subjected to aerials predation events.

A second project is a five year collaborative project to improve the nesting success of the Black-fronted tern population on the Clarence/Waiau Toa. Canterbury's braided rivers are a stronghold for the black-fronted tern, supporting an estimated 60% of the breeding population. However, the species is also suffering from a large rate of decline as a result of mammalian predation and the loss of habitat through the invasion of woody weeds onto braided river beds. In the Clarence/Waiau Toa the black-fronted terns nest within Area 3. Together with the Department of Conservation and the Regional Committee, the Kaikōura Zone Water Management Committee, is helping address these key threats via helping fund an extensive 5-year mammalian predator control programme targeting hedgehogs, ferrets, stoats, cats, possums, weasels. The project also involves the creation of weed-free nesting islands for the birds. Both projects are now entering their second nesting season (2016-2017).

Threatened Native Plants

Within the Clarence/Waiau Toa catchment at least 100 Threatened or At Risk plant taxa have been recorded, some of which up until recently were thought to have been extinct and extinct in the wild. A few specific examples of the threatened species within the catchment are: Pgymy Goosefoot (extinct), re-discovered in 2015, Slender Button Daisy (extinct in the wild), re-discovered in 2015. Marsh arrow grass (Nationally Critical), Chalk Cress (Nationally Critical), Hairy willowherb (Nationally Critical), Weeping broom (Nationally Endangered), *Gingidia* "aff *enysii"* unnamed (Nationally Endangered, endemic to the Clarence/Waiau Toa catchment), Bearded mousetail (Nationally Endangered), Deciduous tree daisy (Nationally Endangered) and Clarence forget-me-not (presumed extinct, endemic to the Clarence/Waiau Toa catchment).

Native Threatened Plants Technical Notes (to help inform an eventual threatened plant map of the catchment and booklet)

Leptinella filiformis (Slender button daisy), listed as Nationally Critical and thought to be extinct in the wild, was discovered on a bare knob just above the mid-Clarence River.

Pachycladon fasciarium (Chalk Cress), a Nationally Critical herb found on limestone bluffs, known only from South Marlborough. This plant is long lived (some individuals are known to

be at least 25-30 years old), it flowers once then dies. There are less than 50 known individuals of this plant.

Triglochin palustris (marsh arrow grass), a Nationally Critical wetland species, the seed capsules (immature in below photo) ripen to produce a distinctive arrow head. Found only on the eastern side of the South Island, this is the first record for Marlborough.

Epilobium hirtigerum (hairy willowherb). This Nationally Critical species has a large population in the wetlands and seeps between Lake McRae and the Dillon. A short lived species it has disappeared from wetlands nationally through wetland loss and modification. The Clarence populations represent a stronghold for the species.

Carmichaelia stevensonii (weeping broom), Threatened – Nationally Endangered. A tree broom known only from South Marlborough, this species naturally occurs on seeps and riparian zones at the tree line. Pressure from browsers have caused a reduction in this species and it is now Nationally Endangered. The largest population occurs at the north western end of the Seaward Kaikōura Range (between the two sides of "Clarence Bend").

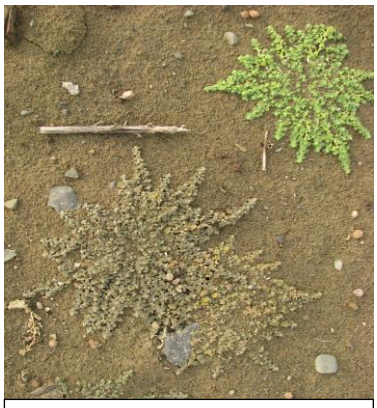
Gingidia "aff *enysii".* An unnamed member of the aniseed family, this taxa is known only from limestone pavements within the Clarence and is Nationally Endangered. It appears to be long lived but is very localised in its distribution.

Myosurus minimus subsp. *novae-zelandiae* (bearded mousetail), this small spring annual is only visible for a few months of the year when conditions are right. A very large population exists under kanuka forest in the lower mid sections of the Clarence catchment and represents one of the largest populations in NZ.

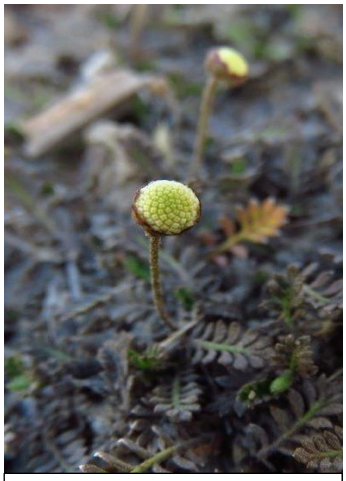
Olearia hectorii (Deciduous tree daisy), this Nationally Endangered deciduous tree occurs on fertile alluvial and colluvial sites. Found only in the eastern South Island, one of the largest populations in NZ occurs within the catchment. It is one of the few populations where natural recruitment still occurs.

Myosotis laingii (Clarence forget-me-not), presumed extinct. It has only been recorded from the upper Clarence catchment and it is possible this species still occurs here as surveys for it have not been exhaustive.

[1] Forest & Bird (2016). *New Zealand Seabirds: Sites on Land, Rivers, estuaries, coastal lagoons & harbours*. The Royal Forest & Bird Protection Society of New Zealand, Wellington, New Zealand.
[2] http://braid.org.nz/2015/12/clarence-river-rafters-help-monitor-braided-river-birds/
[3] http://www.huttonsshearwater.org.nz/about-the-huttons-shearwater/
Photo and Information Credit: Jan Clayton-Greene, Department of Conservation



Dysphania pusilla
(Pgymy Goosefoot)



Leptinella filiformis
(Slender button daisy)

Olearia hectorii
(Deciduous tree daisy)

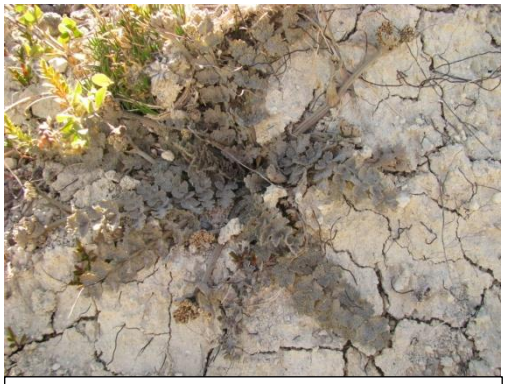
Pachycladon fasciarium
(Chalk Cress)

Triglochin palustris
(marsh arrow grass)

Myosotis laingii
(Clarence forget-me-not)

Epilobium hirtigerum
(hairy willowherb)

Carmichaelia stevensonii
(weeping broom)



Gingidia "aff *enysii*" (an unnamed member of the aniseed family)

Myosurus minimus
subsp. *novae-zelandiae*
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