Canterbury Water Management Strategy
Waimakariri Zone Committee

Agenda

Monday 13 November 2017

4.00pm

Function Room, Rangiora Town Hall
303 High Street, Rangiora

Members:

David Ashby (Chair)
Grant Edge (Deputy Chair)
Carolyne Latham
Judith Roper-Lindsay
Gary Walton
Cameron Henderson
Michael Blackwell
Nigel Harris (Te Ngai Tūāhuriri Rūnanga)
Cherie Williams (Te Ngai Tūāhuriri Rūnanga)
Sandra Stewart (WDC Councillor)
Claire McKay (ECan Councillor)

Chairperson and Members

CWMS WAIMAKARIRI ZONE COMMITTEE

Agenda for the meeting of the **CANTERBURY WATER MANAGEMENT STRATEGY WAIMAKARIRI ZONE COMMITTEE** to be held in the **FUNCTION ROOM, RANGIORA TOWN HALL, 303 HIGH STREET, RANGIORA** on **MONDAY 13 NOVEMBER 2017** at **4.00PM.**

Adrienne Smith
Committee Advisor

Recommendations in reports are not to be construed as Council policy until adopted by the Council

BUSINESS PAGES

KARAKIA

1 **APOLOGIES**

REGISTER OF INTERESTS

5 - 6

Conflicts of interest (if any) to be reported for minuting.

CONFIRMATION OF MINUTES

1.1 **Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting – 9 October 2017**

7 - 14

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

(a) **Confirms** the circulated minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting, held on 9 October 2017, as a true and accurate record.

MATTERS ARISING

2 **OPPORTUNITY FOR PUBLIC TO SPEAK**

3 **COMMITTEE UPDATES** – Zone Committee Members, M Griffin (CWMS Facilitator, ECan) A Arps (Waimakariri Zone Delivery Team Leader, Ecan)

15 - 16

3.1 **Regional Water Committee Working Groups meeting – 10 October 2017** (CWMS Regional Committee representative Carolyne Latham)

17 - 18

3.2 **Wakeman Trust Wetland application for Immediate Steps Funding** (Zone Committee member Judith Roper-Lindsay)

19

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

(a) **Approves t**he Immediate Steps funding application from Wakeman Trust of $7,262.50, noting the following:

I. Jason Butt (Ecan) should work with the Wakeman family to advise on planting and maintenance.

II. The management agreement attached to the IMS funding should note that there should be no further excavation for ponds in the wetland.

3.3 **Media and Communications Report – 11 August – 6th November 2017 –** (Gina McKenzie, Real Communications)

20 - 21

3.4 **Ecan Land Use Consents to Farm Update –** (copy of presentation from Anna Veltman to 9 October Zone Committee meeting)

22 - 28

3.5 **CAREX report on Glyphosate** – (report from Greg Bennett, WDC Land Drainage Engineer, to the Waimakariri District Council meeting of 24 October 2017, circulated to the Zone Committee for information)

29 - 50

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

(a) **Receive** these updates 3.1, and 3.3 – 3.5 for its information and with regard to the committee's 5 Year Outcomes, drafting of the Land and Water Solutions Programme recommendations, and 2017 community engagement priorities.

4 **WAIMAKARIRI DISTRICT COUNCIL RANGIORA STORMWATER NETWORK DISCHARGE CONSENT APPLICATION** – Janet Fraser (Utilities Planner, WDC)

51 - 52

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

(a) **Receives** this briefing paper.

(b) **Notes** the pending application for stormwater discharge consent for the Rangiora stormwater network to be lodged shortly with Environment Canterbury.

(c) **Notes** the application processing by Environment Canterbury and agreements reached therein will provide a template for the stormwater consent application processes for the other major towns in the District.

5 **SILVERSTREAM SALMON HATCHERY UPDATE – IDEAS FOR IMPROVING WATER QUALITY AND FLOWS IN THE SILVERSTREAM** –Karl French (Silverstream Hatchery Manager) and Matt Dodson (Ecan Hydrogeologist)

53 - 56

6 **GENERAL BUSINESS** – D Ashby and Zone Committee members

WAIMAKARIRI ZONE COMMITTEE

Register of Interests – at November 2017

Name	Committee Member Interests
David Ashby	- Director/shareholder: Pineleigh Farm Limited - Director/shareholder: Dave Ashby Rural Consultants Limited - Shareholder: Waimakariri Irrigation Limited - Member: Cust Main Drain Water User Group
Michael Backwell	- Director/ Shareholder Blackwells Limited , Kaiapoi - Treasurer, North Canterbury Clay Target Association - 4HA property, Tuahiwi.
Grant Edge	- Director: Edge Landscape Projects Ltd, Edge Plants Ltd, and Edge Products Ltd - Member: NZ Institute of Landscape Architects - Member: Urban Design Forum - Member: QEII National Trust - Member: NZ Forest & Bird - Member: Heritage NZ - 1ha property Fernside (shallow bore user)
Nigel Harris	- TBC
Cameron Henderson	- Dairy Farmer - Groundwater irrigator - Member - NZ Institute of Primary Industry Management - Member - NZ Dairy Environment Leaders Forum - Chairman - DairyCan - Canterbury Dairy Environment Leaders Forum - Treasurer and Vice Dairy Chair - North Canterbury Federated Farmers
Carolyne Latham	- Farmer: Sheep, beef and racehorse agistment - Director of Latham Ag Ltd Consulting - Shareholder: Silver Fern Farms, Farmlands - Registered Member: New Zealand Institute of Primary Industry Management - Member: Canterbury Ice Hockey Association
Claire McKay	- Dairy Farmer - Irrigator and shareholder: Waimakariri Irrigation Ltd - Holder of Groundwater take and use consents in Cust groundwater allocation zone - Holder of Effluent discharge consents - Member: Federated Farmers - Member: DairyNZ Dairy Environmental Leaders forum - Member: P21 Canterbury Industry Advisory Group
Judith Roper-Lindsay	- Director/ecologist: JR-L Consulting Ltd. - Land-owner/small-scale sheep farmer, Ashley downs - Fellow: Environment Institute of Australia and New Zealand (EIANZ)
Sandra Stewart	- Self-employed journalist - Land-owner, 4ha Springbank – sheep & dogs

Gary Walton	- Director, Walton Farm Consulting Ltd - Director & Shareholder, Loburn Irrigation Co - Trustee, Rugby World Heritage Trust - Ashley Rugby Football Club (Inc.) - Farmer, sheep & cattle, Loburn
Cherie Williams	- Member: Mana Whenua Working Party - Tangatiaki / Kaitiaki - NZTA Northern and Southern Bypass Rūnanga Representative

MINUTES FOR THE MEETING OF THE CANTERBURY WATER MANAGEMENT STRATEGY WAIMAKARIRI ZONE COMMITTEE HELD IN THE FUNCTION ROOM, RANGIORA TOWN HALL, 303 HIGH STREET, RANGIORA ON MONDAY 9 OCTOBER 2017 AT 4.00PM.

PRESENT

David Ashby (Chair), Grant Edge (Deputy Chair), Carolyne Latham, Cameron Henderson, Judith Roper-Lindsay, Gary Walton, Sandra Stewart (WDC Councillor) and Claire McKay (Environment Canterbury Councillor).

IN ATTENDANCE

Brent Walton (WIL), Anna Veltman (Land Management Advisor, Ecan), Geoff Meadows (Policy Manager, WDC) (from 4.30pm), Larry Burke (NZ Salmon Anglers Association), Karl French (Silverstream Hatchery), Michael Bate (Kaiapoi), Gina McKenzie (Real Communications), Maureen Whalen (Groundwater Team Leader, Ecan), James Ensor (Oxford-Ohoka Community Board member, WDC), Annie McLaren (Synlait Milk Ltd), Emma Brand (Synlait Milk Ltd), Laura Bunning (Balance Agri-Nutrients), Lionel Hume (Federated Farmers of NZ), Andrew Mehrtens (WIL and farmer), Neville Thompson (WIL and farmer), Greg Morriss (Farmer), Des Winter (Farmer), Adrian Meredith (Principal Surface Water Quality Scientist, Ecan), Andrew Arps (Zone Team Manager, Ecan), Tegan Wadworth (Consents, Ecan), Jason Butt (Biodiversity Officer, Ecan), Murray Griffin (CWMS Facilitator, Ecan) and Adrienne Smith (WDC Committee Advisor).

1 APOLOGIES

Moved Judith Roper-Lindsay seconded Claire McKay

THAT the Waimakariri Water Zone Committee

Receive and sustain apologies from committee members Michael Blackwell and Nigel Harris.

CARRIED

ANNOUNCED URGENT BUSINESS

There was no announced urgent business.

REGISTER OF INTERESTS

There were no updates to the Register of Interest.

CONFIRMATION OF MINUTES

1.1 **Minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting – 14 August 2017**

Moved Gary Walton seconded Grant Edge

THAT the CWMS Waimakariri Zone Committee:

(a) **Confirms** the circulated minutes of the Canterbury Water Management Strategy Waimakariri Zone Committee meeting, held on 14 August 2017, as a true and accurate record.

CARRIED

MATTERS ARISING

S Stewart asked for an update on Plan Change 5. Councillor McKay advised that Ecan were still awaiting clarification on some points of law and it could be some months before the appeals are heard in the High Court.

In relation to the Waihora Stream consent, A Arps advised there has been meetings with the Ravenswood developers and operators working on the site. Ecan Compliance officers are making sure the augmentation of the stream has been undertaken and the outcome could be better than previously anticipated. There is fortnightly meetings between the Ecan Compliance officers, the developers, engineers and ecologists. A Arps said documentation on this matter will be circulated to members on this Committee.

A meeting of the Cam River Enhancement fund group was held on August 24th, and funds have all been allocated. A Report and recommendations will go to the Waimakariri District Council.

J Roper-Lindsay asked for update on the Canterbury Landscape Supplies – Andrew Arps to provide an update as part of his presentation during this meeting.

2 OPPORTUNITY FOR PUBLIC TO SPEAK

Michael Bate

Mr Bate was present and reiterated concerns he has previously spoke to the committee about, regarding the effects of the use of Glyphosate. Copies of a Press Release from the Soil and Health Association were circulated to members of the committee. .

Brent Walton – Waimakariri Irrigation Ltd

Brent Walton provided an update on the Discharge and Water take consent condition, with Farm Environment Plan audits completed by the end of September. There have been good results shown in this process The properties, which were previously marked “D”grade,have made improvements and if reassessed now would most likely be C grade. In 12 months’ time, all properties must be above the “D” grade, and by 2019, all properties will need to be above “C” grade. Good progress has been made with the roll out of soil moisture monitoring. In an update on other activities, a section of main race lining towards the intake has been completed and some other maintenance activities are being undertaken. There has been good progress made towards meeting GMP by 2020.

Greg Morriss, Farmer Sefton

Mr Morriss farms at the lower end of Saltwater Creek and spoke on water flow measure sites in the area. There are two measuring sites for the minimum flow records, the one on their property has considerably more flow than the one on Toppings Road and suggests that neither of these sites has an accurate measuring device. Gary Walton advised that he has been to visit these sites and questioned the measuring of these flows. At times there is backward flow from Saltwater Creek. The impression he left with was that these property owners have an issue with too much water invading their properties. It was noted that some good planting has already started.

Sandra Stewart said these measuring sites need to be inspected by Ecan staff. Carolyne asked how changes to the flow can be decided upon if the accuracy of figures is not known. Andrew has agreed to follow this up and provide an answer this week to the Committee.

Since the earthquakes, Greg advised there is higher levels of water cover of their property, and some of this is saltwater, and some is a mixture of salt and fresh water.

David Ashby advised findings from the farmer reference panel for the past two years has been presented to the Zone Committee workshop. These presentations will be made available to members of the public who may be interested in these.

3 **COMMITTEE UPDATES** – Zone Committee Members, M Griffin (CWMS Facilitator, ECan) A Arps (Waimakariri Zone Delivery Team Leader, Ecan)

3.1 **Regional Water Committee Working Groups meeting – 12 September 2017**

Regarding Braided River/Biodiversity and the question to zone committees on how to achieve a step-change in biodiversity in terms of long term planning, Sandra asked how this is to be advanced. Carolyne said the working group would be asking for ideas from Ecan staff as to how this could be achieved. Claire McKay added that the Biodiversity Step Change is part of the Ecan LTP.

Moved Gary Walton seconded Grant Edge

THAT the CWMS Waimakariri Zone Committee:

(a) **Receives** the information from the Regional Water Committee Working Groups meeting of 12 September 2017

CARRIED

THREE IMMEDIATE STEPS FUNDING APPLICATIONS

Ecan Biodiversity Officer Jason Butt tabled an Immediate Steps funding October update and presented the three applications for Immediate Steps Funding for the committee to consider.

Currently there is $127,000 of Immediate Steps funding available, as there hasn't been any funds spent this year to date.

3.2 **White Rock Mains QEII Covenant**

This application is for a piece of land in the middle of White Rock Station. Funding of $86,000 is sought for fencing to exclude stock. The fencing will assist the landowner's desire to have a QEII covenant placed on this land

parcel. It is proposed that this funding be allocated over the next three years, with $30,000 from this year. This entire block of vegetation is included in the Waimakariri District Council District Plan as an area of significance. Primarily the fencing would be to keep farm stock out of the area. The area is a Black Beech forest, with Red Beech and pockets of Kānuka. There are areas of gorse and broom with natives coming up through this and some wilding pines across the site. There is funding available to deal with the wilding pines. Landowners have expressed a willingness to have public access available to this area.

Jason confirmed this is a high value project for biodiversity. One sixth of a project can be taken as land retirement.

Claire McKay acknowledged that the area is an SNA and noted concerns with the amount of the funding request .

Grant said this area ticks boxes with connectivity and keeping the extensive natural bush area intact. It was pointed out that it is quite rare in the zone to have both black beech and red beech. If this is placed in a QEII covenant, this will assist to wind back the Wilding Pine invasion.

Gary Walton noted this is a significant amount of land and supports the owners retiring this land.

Judith shared concerns with the large amount of funding applied for, but agrees with protecting the area.

Moved Gary Walton seconded Judith Roper-Lindsay

THAT the CWMS Waimakariri Zone Committee:

(a) **Approves** $86,000.00 of Immediate Steps Funding to the White Rock Mains QEII Covenant for fencing to exclude stock from protected forest in Oxford Ecological District.

CARRIED

3.3 **Morriss Farm Wetland Restoration**

This application is for funding of restorative planting of an existing wetland, of a variety of native plant species that otherwise will be unlikely to re-establish on the site. Gary Walton said there has been work already undertaken removing willows and has visited this site and supports this planting project. The application notes that the applicants are contributing significant personal resources to the project.

Grant Edge questioned the need to have plant guards, and doesn't agree that these would be necessary. It was suggested the $3,047 included for the supply of plant guards, could instead go towards purchasing more plants. There was discussion on rabbit numbers in the area. Mr Morriss (property owner) noted there aren't large numbers but birdlife could be an issue though, with quite a population of ducks and Pūkeko in the area.

Moved Judith Roper Lindsay seconded Carolyne Latham

THAT the CWMS Waimakariri Zone Committee:

(a) **Approves** $10,313.00 of Immediate Steps Funding to G D Morriss for fencing and planting of the Morriss Farm Wetland Restoration and ongoing management of the site at 82 Dicks Road, Sefton.

CARRIED

3.4 **Wakeman Trust Wetland**

This funding application is to increase the range and supply of plant species to those that have already been voluntarily planted on this site, located at Ferrys Road/Lees Road, Woodend Beach. This area was formerly wetland that had been drained to allow farming and had been the farmer's prime hay making paddock. Since the 2010/2011 earthquakes the land has returned to wetland and some native vegetation cover has returned. The owner is happy to retire the land. This area is close to the Te Kōhaka o Tūhaitara Trust land boundary.

Councillor Claire McKay has reservations for this application as it is separated from the Trust land. There was discussion regarding the wetland area and the lack of drainage. Greg Bennett (WDC Land Drainage Engineer) explained that there is a drain which has been cleared annually since the earthquakes. Jason advised that there would need to be weed control undertaken regularly, to keep these under control. In a significant rainfall event there would be a lot of water above ground.

It was suggested that some committee members visit the site to get a better understanding of the area. Grant suggested that there will be issues of sea levels rising, and Council won't be able to drain it. It was agreed that Judith, Sandra and Grant will visit the site and report back to the committee with a ratified recommendation at the next meeting.

3.5 **Waimakariri Water Zone Committee September e-newsletter Update**

3.6 **Compliance Monitoring Report Waimakariri Zone August 2017**

3.7 **Compliance Monitoring Annual Snapshot Report – 1 July 2016 to 30 June 2017**

3.8 **Environment Canterbury's Long Term Plan – Murray Griffin (Zone Facilitator)**

Items 3.5 to 3.7 were received for information and it was agreed, due to meeting time constraints, that Item 3.8 will be distributed to members via email, seeking their comments.

4 **WAIMAKARIRI 2018 ON THE GROUND WORK PROGRAMME - BRIEFING**– Andrew Arps (Zone Team Manager, Waimakariri) and Murray Griffin (CWMS Facilitator Waimakariri, Ecan)

Andrew provided an update on Canterbury Landscapes business, which has set up a 10 ha site near the Eyre River, on Diversion Road. Part of the business involves composting and this has been carried out for over a year without a consent. A WDC land use consent had been applied for in July, with further information requested. The information is being worked through. Consents for discharge to water and discharge to air have also been sought from Ecan. These are on hold awaiting further information. An Abatement Notice has been issued by Ecan, in relation to the odour, which can at times be smelt up to three to four kilometres away. In response to this Notice, the company has appealed and applied for a Stay, which involves having twice weekly visits by Ecan staff. A residents group has been formed objecting to the composting operation. The group's main concerns are odour, discharge to land and the effects of drinking water. The residents group are intending to make contact with the Zone Committee with their concerns on the effects of drinking water.

Anna Veltman provided an update on discharge consents on farms in the district, through a PowerPoint presentation "Land Use Consents to Farm". This noted that there are 42,000 hectares of irrigated land in the Waimakariri zone, which includes Waimakariri Irrigation Ltd, Ngai Tahu and other irrigation schemes. Information was provided on the number of smaller irrigated properties still requiring consents, and also information provided from Dairy NZ and Synlait.

Andrew presented the BIG ROCKS draft document, a copy of which had previously been circulated to the committee members. This is to be a starting point for a refreshed work programme for the start of 2018. It is planned that this document is intended as a 'working document' that will develop with the committee's feedback. He added while this document works within statutory requirements it is more of an "on the ground" look at the work of the Zone Delivery team. Sometimes there will be other parties taking the lead on projects with the Zone Delivery team taking the support role in those instances.

The BIG ROCKS term is to indicate that these are the priority "on the ground" actions. Andrew said generally this document is considered to be a collective arrangement with both the Zone delivery team and the zone committee. The document is focused on the following priority areas:

- Relationship and Respect
- The Old Waimakariri Loop
- Cam to the River
- Tūhaitara Coastal Park Extension
- Te Aka Aka Connections
- Ashley Rakahuri Stepping Stones
- Foot Hills and Lees Valley Protection
- GMP Showcase
- Compliance and Alliance Programme

Carolyne asked how this document will relate to the Zip Addendum. Andrew said this is sits alongside and will likely contribute to the actions of the Zip Addendum. The priority areas were seen as something that the community can relate too. It

relates to the community outcomes, and the CMWS Targets, which are included in the document as prompts.

Councillor Stewart questioned if there had there been discussions with Waimakariri District Council about this document. Andrew said this document is definitely to be developed with other parties and commented that funding will be an issue, but once these projects are framed up, there will be more idea of what costs will be involved. There will need to be coordination to bring all the parties together.

Grant said there is the need to get the CWMS Recreation Amenity Working Group to discuss these matters.

With regard to the Ashley/Rakahuri 'Stepping Stones' project Grant suggested the District Council will need to designate the Ashley/Rakahuri as an Outstanding Natural Landscape in the upcoming District Plan.

Grant suggested another project, the 'Waimakariri River Corridor' Project would be good as this is already an area of focus for recreation.

Committee members said they would like to see the Zip Addendum developing alongside this document. Members are also asked to read through and make any comments on this document, or it can be covered in a workshop. Andrew said he hoped to have something framed up by Christmas, working with the format of this document.

5 **GENERAL BUSINESS** – D Ashby and Zone Committee members

Judith tabled notes from a meeting she attended on 4 October at Rakahuri Kaiapoi Civic Centre. This meeting was to discuss opportunities for integrated management of land and water in the Cam River catchment under the CWMS.

Claire McKay noted that on August 21, former committee member Clare Williams, representing Ngāi Tūāhuriri Rūnanga, was presented with an Outstanding Contribution Award from Environment Canterbury. Clare had been an inaugural member of the Zone Committee until her retirement in May 2017. Claire McKay spoke at the presentation on behalf of this Zone Committee. It was agreed that a letter be sent to Clare thanking her from this Zone Committee. Murray will follow up with this.

Below is the Citation which was read at the Ecan presentation:

In recognition of the outstanding contribution that Clare Williams has made to this Council as a Ngāi Tūāhuriri representative engaged in the implementation of the Canterbury Water Management Strategy and the Environment Canterbury Tuia partnership.

Clare has been at the forefront of natural resource and environmental management on behalf of Ngāi Tahu whānui and Ngāi Tūāhuriri for many years.

Clare as a representative of Ngāi Tūāhuriri Rūnanga has worked in partnership with Environment Canterbury, Waimakariri District, Selwyn District, Hurunui District and Christchurch City Councils.

Clare is a founding member of the Waimakariri and Selwyn Waihora water management zone committees. The committees have engaged in a pioneering form of collaborative governance inclusive of local and regional councils, Ngāi Tahu, community, industry stakeholders, and NGO's, to develop and implement solutions to ensure the sustainable management of freshwater resources in these catchments.

Clare's desire for and active pursuit of the retention and enhancement of mahinga kai values being integral to the solutions package and wider outcomes being sought by the zone committees is a clear achievement and is to be commended.

Further, Clare was instrumental in the development of the Mahaanui Iwi Management Plan. The plan provides councils with guidance and direction regarding

Ngāi Tahu values and environmental management. The plan being an expression of kaitiakitanga and rangatiratanga also means working together in a spirit of partnership.

This council expresses its gratitude and congratulates Clare for her commitment to the Canterbury Water Management Strategy and for her meaningful contribution in strengthening the partnership between this council and Ngāi Tahu whānui.

Nāu te rourou, nāku te rourou, ka ora ai te iwi

Carolyne talked with Richard Stalker, of the Cam Irrigators Group, who are starting up a Water Users Group, so farmers can share information and show how they can improve the Cam River.

Murray asked members what preference they would have for meeting start times for next year. Following discussion, it was agreed that the meeting start time for 2018 be set at 3.00pm, to have a planned finish time of 6.00pm.

NEXT MEETING

The next meeting of the Committee is scheduled for Monday 13 November 2017 at 4pm, in the Rangiora Town Hall Function Room.

There being no further business, the meeting closed at 6.15pm.

CONFIRMED

_____

Chairperson

_____

Date

AGENDA ITEM NO: 3	SUBJECT: Committee Updates
REPORT TO: Waimakariri Water Zone Committee	MEETING DATE: 13 November 2017
REPORT BY: Murray Griffin, CWMS Facilitator – Waimakariri, ECan	

PROPOSAL

This agenda item provides the committee with an overview of updates for review.

RECOMMENDATIONS

- The Zone Committee are asked to receive these updates for its information and with regard to the committee's 5 Year Outcomes, drafting of the Land and Water Solutions Programme recommendations, and 2017 community engagement priorities.

- The committee are also asked to consider the Wakeman Wetland application submitted to the Water Zone Committee for Immediate steps funding.

COMMITTEE UPDATES

The following updates are tabled for the committee:

1. **ECan update**
   Councillor Claire McKay will provide an update in conjunction with Jill Atkinson, Director of Strategy and Planning.

2. **CWMS Regional Committee Meeting – 10 October 2017**
   The last Regional Committee meeting was held on Tuesday 10 October. The next Regional Committee Working Group meetings will be held on Wednesday 15 November.

- Carolyne Latham, the Zone Committee's CWMS Regional Committee representative, has prepared a report on the 10 October meeting which is provided as **agenda item 3-1**.
- The link to the CWMS Regional Committee papers is provided below:
  https://ecan.govt.nz/data/document-library/?Search=regional+water+management+committee%2C+agenda&documentTypes=-1&pageSize=12&start=1&sortDir=desc

3. **Waimakariri Zone Delivery – Update**
   Zone Delivery Manager, Andrew Arps, will provided a short update for the committee on current Zone Delivery team priorities and actions.

- **Immediate Steps**

A report by Judith Roper-Lindsay is provided as **agenda item 3-2,** for the committee's consideration of the Wakeman Wetland Immediate Steps application.

- **Communications** – **August to November Update**

An update on communications is provided by Gina McKenzie of Real Communications as **agenda item 3-3**.

- **ECan Land Use Consents to Farm – Update**

At the 9 October Water Zone Committee meeting, ECan Land Management Advisor Anna Veltman presented an update on Land Use consents for the committee. This is provided as **agenda item 3-4**.

4. CAREX report on glyphosate for Waimakariri District Council

On 24 October Greg Bennett, Land Drainage Engineer presented the attached report to the Waimakariri District Council. One of the report recommendations was for this report to be circulated to the Community Boards, Drainage Advisory Groups and the Waimakariri Water Zone Committee for their information. It is provided as **agenda item 3-5**.

5. Action List

An updated list of action points from previous meetings will be tabled with the committee to confirm completed items and ongoing follow-up.

RECOMMENDATIONS

- The Zone Committee are asked to receive these updates for its information and with regard to the committee's 5 Year Outcomes, drafting of the Land and Water Solutions Programme recommendations, and 2017 community engagement priorities.

- The committee are also asked to consider the Wakeman Wetland application submitted to the Water Zone Committee for Immediate steps funding.

CWMS Regional Committee Meeting 10th October 2017

1. Zone Committee Updates:

   Waimakariri ZC – An update was provided to the RC. Questions focussed on the science work taking place to determine whether any deep aquifer water was finding its way under the Waimakariri River. The Christchurch-West Melton representative requested their inclusion in updates.

   Kaikoura ZC – Kaikoura water issues continued to be dominated by the earthquake and much uncertainty over what is now happening with groundwater and drainage. Potentially there will be uncertainty for some years. There are many new wetlands in the district. Damage has occurred in areas of biodiversity which may need assistance. Many organisations and institutions are involved in the recovery. The community is struggling with hardship but there have been spinoffs for some from road construction. This has resulted in a delay in the sub-regional process potentially for some years.

   Ashburton ZC – The zone is recovering from an incredibly wet winter, but seen significant welcome increases in groundwater levels. Recent spikes in nitrates recorded in shallow groundwater have been seen, as is to be expected after a series of large scale flushing events. There has been renewed interest in a consents review by NGO's and the ZC has requested information on the range and extent of resource consents from Ecan to get an overview. Ashburton District Council are already below their required abstraction limit. Some of the interest may have come about due to a general lack of understanding in the community regarding the meaning of minimum flow and timing of when the LWR Plan flows come in. A public planting day is being held on the Ashburton River this week which will also be used to canvas views from the community on recreation and amenity.

   OTOP ZC – The ZC are requesting an extension until April for the completion of their ZIPA. The reason for the request is because some of the science information on ecological flows, and economic information, is not yet available.

   The RC requested Ecan to provide summary information regarding when consents are due to expire in relation to the introduction of new minimum flows. It was noted that while instigating early consent reviews was fraught with legal issues, it could be possible to work with eg power generators, towards achieving minimum flows. It was also noted that even when there is no abstraction rivers could be below minimum flow.

2. Managed Augmentation: The committee received a presentation from Ecan summarising the managed augmentation projects currently underway in the region. These included the Hinds MAR project, and the following:
   - Targeted Stream Augmentation – Broadacres (Selwyn) – Extraction of groundwater to augment via ground percolation a tributary of the Selwyn River which was once a significant native fish habitat as trout couldn't access it, but which has been lost due to 3 years of drought. It is ready to commission but the waterway has been reinstated post April rainfall. It is now being surveyed to see whether the native fish have returned, otherwise eg mudfish, may need to be transferred there. This project is an ecological project.
   - Near River Recharge – Waikirikiri/Selwyn River – This project is also primarily for ecological outcomes, but also for supplementing domestic bores, the trout fishery, and recreation at the Te Waihora end. It is similar to the Hinds MAR project but utilises a 1.6ha basin within a forest area on very leaky soils which pose no chance of causing flooding elsewhere. It will supplement an area of springs to the south alongside Selwyn River. The aquifer is around 10m below the surface. Ecan were asked if they had investigated the groundwater ecosystem, and the RC were advised that they hadn't to date, because they didn't consider the science available on this was sufficient to draw any conclusions from any testing.

A committee member asked what is the end game with augmentation, where does it all stop? Ecan advised that it was part of being able to deliver on the CWMS, that it was a way of testing solutions as modelling couldn't do everything, and it was one piece of the puzzle. It was also noted that in areas where more than GMP was required under a sub-regional plan, augmentation was a possible solution. The next step with the Hinds project is how to deal with the fact that the problems are non-point source so non-point solutions were required. To extend Hinds would require eight times as much water, and it was questionable as to whether this water would be best left in the river. A cost and benefit analysis would be required to upscale.

3. Targets Reporting: The targets report had been presented to the Mayoral Forum in August, who confirmed that they considered the CWMS as the best mechanism for achieving water outcomes. The targets identified as "not started" in the report were in relation to drinking water, recreation/amenity and freshwater species and habitat, and the committee work-shopped ways of getting these targets started, while at the same time considering the implications funding implications. An interesting statistic was that a 1% increase in rates results in around $1 million additional funding for Ecan, $4 million for Christchurch City, and obviously significantly less for the smaller districts.

4. Ecan GMP Campaign Update: A similar presentation was received to that presented by Anna Veltman and Andrew Arps at the WWZC meeting on 9th October. Similar campaigns have been taking place across Canterbury depending on where the various Zones are at with their sub-regional plans. Kaikoura is excluded due to earthquake issues.

5. Working Groups Updates: Refer to notes from WG meetings dated 12th September 2017 previously emailed out. The RC's role in relation to oversight of the Alpine Rivers which were outside Zone boundaries was discussed. Ecan to come back to RC with a presentation to clarify, and provide further details on collaboration taking place between Ecan, DOC and LINZ in relation to braided rivers. The RC also seeks further information on the planning programme, with respect to the Alpine Zone and how it would be managed when resourcing was available to progress it.

6. Telling Our Story: Some statistics were presented from Ecan indicating the radical changes in communications in the last five years, particularly with the time spent daily on social media increasing 250% over that time. Ecan have a communications team of 10 people, with 5-6 people actively working in the water space. However it was noted that Ecan by itself, may not necessarily be the best messenger for getting information out, and works closely with partners to be more effective.

7. General Business:

   - The Chairman reported that the ZC Chair/Deputy Chair meeting went well and provided a very useful forum for discussion.
   - ZC refreshes have now closed and will be completed by December.

8. Location of Agenda Papers:

https://www.ecan.govt.nz/data/document-library/?Search=regional+water+management+committee%2C+agenda&documentTypes=-1&pageSize=12&start=1&sortDir=desc

Carolyne Latham
Waimakariri Water Zone Committee RC Rep

Agenda Item 3-2: <u>Report to Zone Committee on Wakeman wetland application for IMS funding</u>

A request for IMS funding was presented to the Zone Committee meeting on 9 October 2017. Members of the committee had some reservations about the proposal based on available information, in particular around:

- the work done through Fish and Game NZ to create ponds; and
- the potential for adjacent land uses and water /drains management to affect the wetland.

Grant Edge and Judith Roper-Lindsay were delegated to visit the site then report back and make a recommendation via email, so that the recommendation could be ratified at the 13 November 2017 ZC meeting. A sit visit with the applicants was held on 19 October and a full report sent to Committee members on 27 October.

In relation to the concerns above:

- Fish and Game funded pond excavation to create wildfowl habitat but have no further input to management; the work was done by John Wakeman. Excavating the ponds has disturbed some of the wetland and it would be inappropriate to do any more excavation. However, the earthworks resulting from the new ponds will be managed to prevent weed spread and siltation, as part of the overall wetland management.

- The wetland is contiguous with the wet land between the Ashley and Waimakariri Rivers behind the coastal sand dunes/pine forests and is similar in character to the wetlands managed in the Trust Coastal Park and by WDC adjacent to Pegasus township (which will be managed by the Trust in future). The land has become wetter since the earthquake due to opening of springs and general land movement. Greg Bennett (WDC) is aware of the site and its potential biodiversity values, and works with the Wakemans to ensure the feeder drains enhance the values while performing as drains. (The main feeder drain flows from Woodend).

Recommendations:

1. The IMS funding application should be approved.

2. Jason Butt should work with the Wakeman family to advise on planting and maintenance.

3. The management agreement attached to the IMS funding should note that there should be no further excavation for ponds in the wetland.

Judith Roper-Lindsay
Grant Edge

AGENDA ITEM NO: 3-3	SUBJECT: Media and Communications Report : 11 August – 6th November
REPORT TO: Waimakariri Water Zone Committee	MEETING DATE: 13 November 2017
REPORT BY: Gina McKenzie, Real Communications	

Media and Communications Report (11 August – 6th November)

Articles published

- Friday 11th August – Kaiapoi Advocate – article on trimming of Kaiapoi River stopbank trees.
- Friday 18th August – Northern Outlook – article on salmon smolt release at Silverstream hatchery (front page) https://www.stuff.co.nz/the-press/news/north-canterbury/95797589/king-salmon-smolt-make-a-dash-for-the-sea-during-full-moon
- Thursday 24th August – North Canterbury News – article on FEPs and update from Dave Ashby on Waimakariri Zone Committee work
- Thursday 24th August – North Canterbury News – Lifestyle Block Environment Plan article – asking people to get involved in pilot project
- Friday 25th August – Kaiapoi Advocate – Abatement notice for Canterbury Landscape Supplies
- Friday 25th August – Northern Outlook – NIWA 5-year irrigation study results https://www.pressreader.com/new-zealand/northern-outlook/20170825/281599535624559
- Friday 25th August – Kaiapoi Advocate – Drilling tests underway
- Thursday 31st August – North Canterbury News – ZIP progress – article based on interview with Dave Ashby
- Friday 1st September – Northern Outlook –Silverstream planting project – part of the million metres initiative https://www.stuff.co.nz/the-press/news/north-canterbury/96340069/ambitious-planting-project-needs-your-help
- October 13 - Northern Outlook – double-page advertising feature – progress on CWMS relating to Waimakariri Zone
- October 20 – Northern Outlook – full page advertisement – practical tips for people to improve waterways – focus on urban dwellers
- October 20th – Kaiapoi Advocate – as above
- October 20th – Kaiapoi Advocate – “No effect on stream life from glyphosate spraying scientists say” – with image of Dave Ashby
- October 20th – Kaiapoi Advocate – update on composting plant – needed a resource consent according to legal advice
- October 24th – Rural News – Dave Ashby’s opinion piece
- October 25th – Northern Outlook – Dave Ashby’s opinion piece
- October 26th – North Canterbury News – Dave Ashby’s opinion piece
- November 3rd – Kaiapoi Advocate –“Irrigation turning Kaiapoi River salty”
- November 3rd – Kaiapoi Advocate – “Detergent-spraying fishers risk prosecution”

Cinema Advertisement – October – January

- Joint campaign with ARRG – public awareness around restricted 4WD/dogs during nesting season – excellent feedback to date from general public and based on feedback from ARRG.
- Next cinema ad will be focused on lifestyle block owners – showcasing family who took part in the lifestyle block environment plan pilot project.

Current/Ongoing work

- Photos/videos/articles on Ravenswood/Taranaki Stream realignment – showing the importance of putting the environment first when developing subdivisions/different groups working together to improve the environmental outcomes – Joe to report to WZC at December meeting
- Joint campaign with ARRG – public awareness around restricted 4WD/ dogs during nesting season on Ashley/Rakahuri – cinema ad, articles, videos, updated brochure – from October – January – updated brochure to be available within 3 weeks – Ecan to print
- Lifestyle Block Environment Plan pilot project – Sept – January/Feb – opinion piece, articles, photos, videos, cinema ad, social media
- Irrigation NZ Magazine – article on lifestyle block environment plan pilot project and article on Regen/WIL – use of technology to mitigate environmental issues related to irrigation
- Dairy NZ magazine – will publish Dave's opinion piece in December edition of their magazine
- Second opinion piece for Dave will be on the lifestyle block environment plan pilot project – to be published in December/January.

Waimakariri Zone

Update

Land Use Consents to Farm

Land Management Advisor - Anna Veltman

22

Waimakariri Zone

Canterbury Water

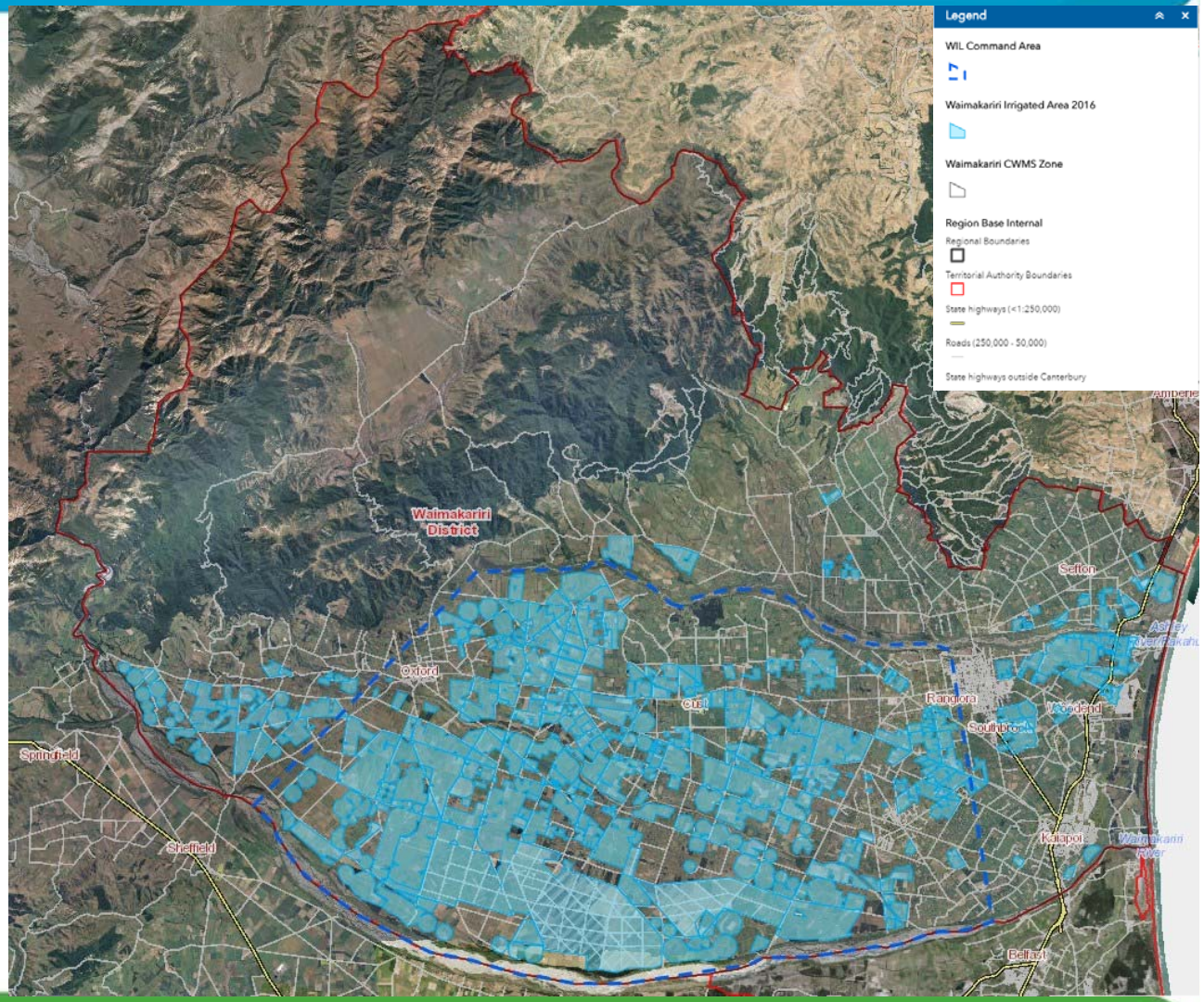
Irrigated Area in Zone 2016

includes WIL/Ngai Tahu/non-WIL

Total area = ±42 000ha

Indicative of more intensive land use in Zone

- *Red Zone - lighter soils*
- *Orange Zone - Lower Ashley – heavier soils*



23

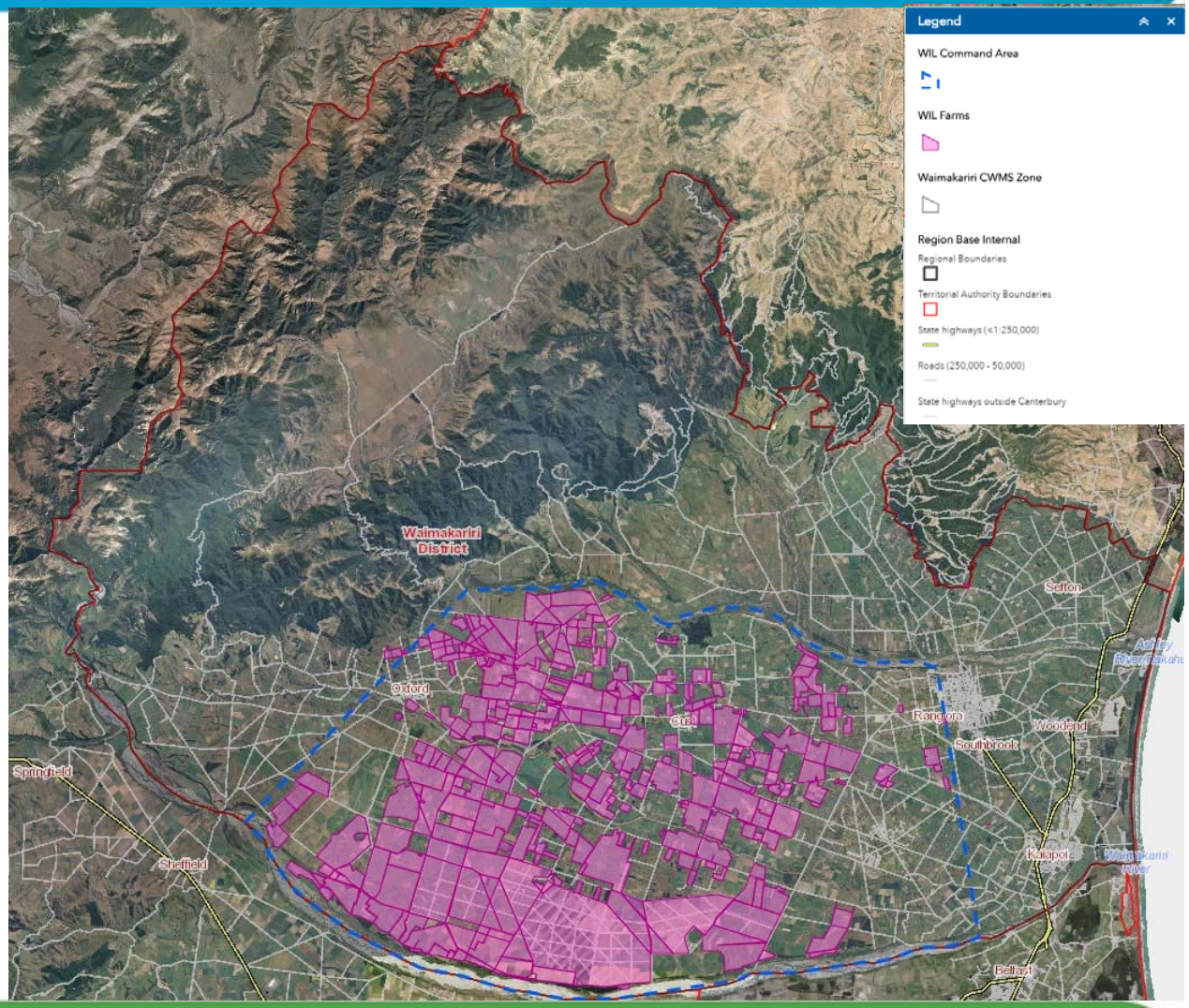
Waimakariri Zone

Canterbury Water

WIL/Ngai Tahu Discharge Consents

2016 information (being updated)

- *all shareholders have FEPs/LBMPs & 106 audited*
- *compliance with consents conditions*



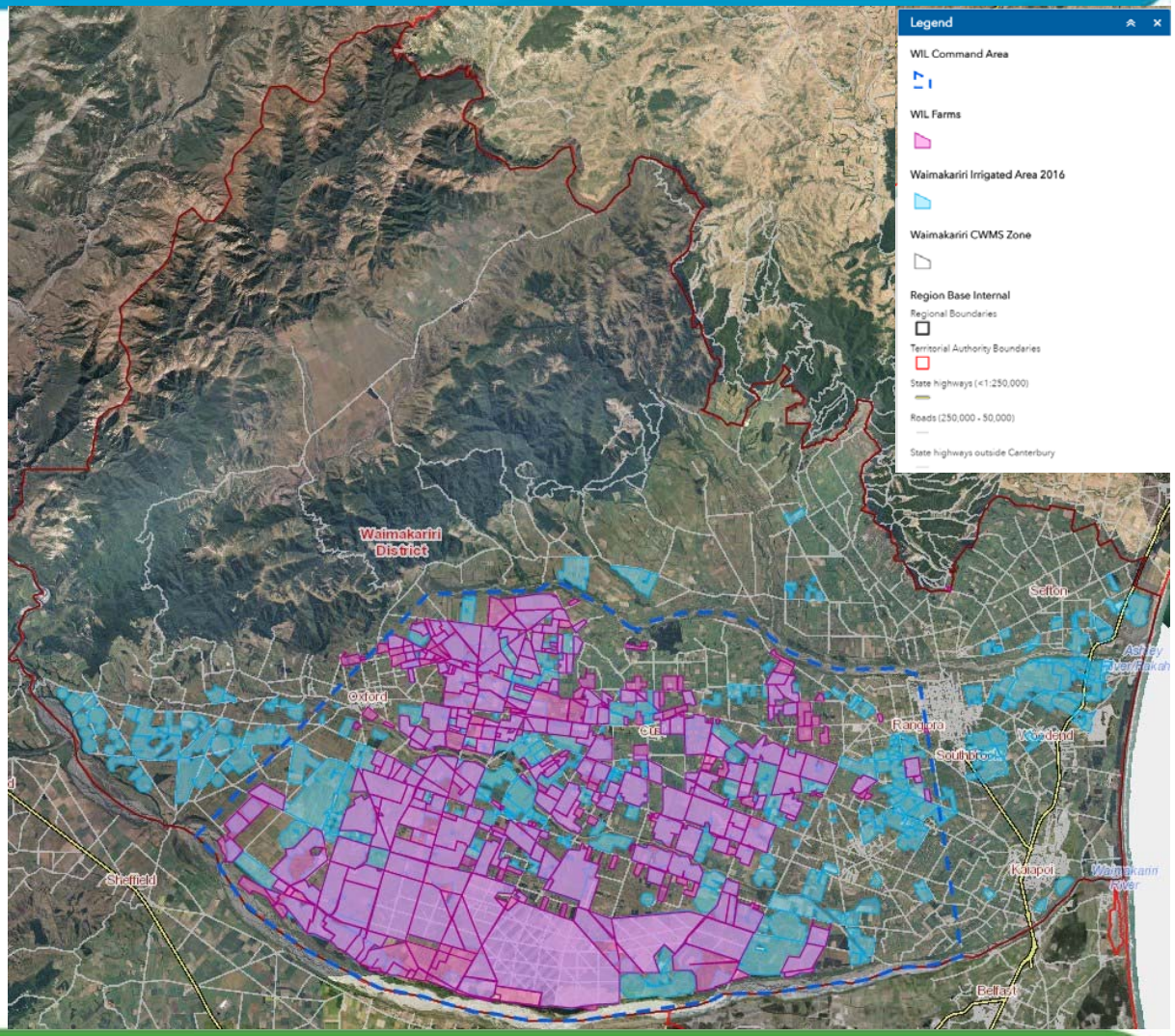
24

Waimakariri Zone

Canterbury Water

Irrigated Area 2016

- *Showing the area covered by WIL/Ngai Tahu consents*
- *Light blue areas > 50 ha will require consents when PC5 operative*



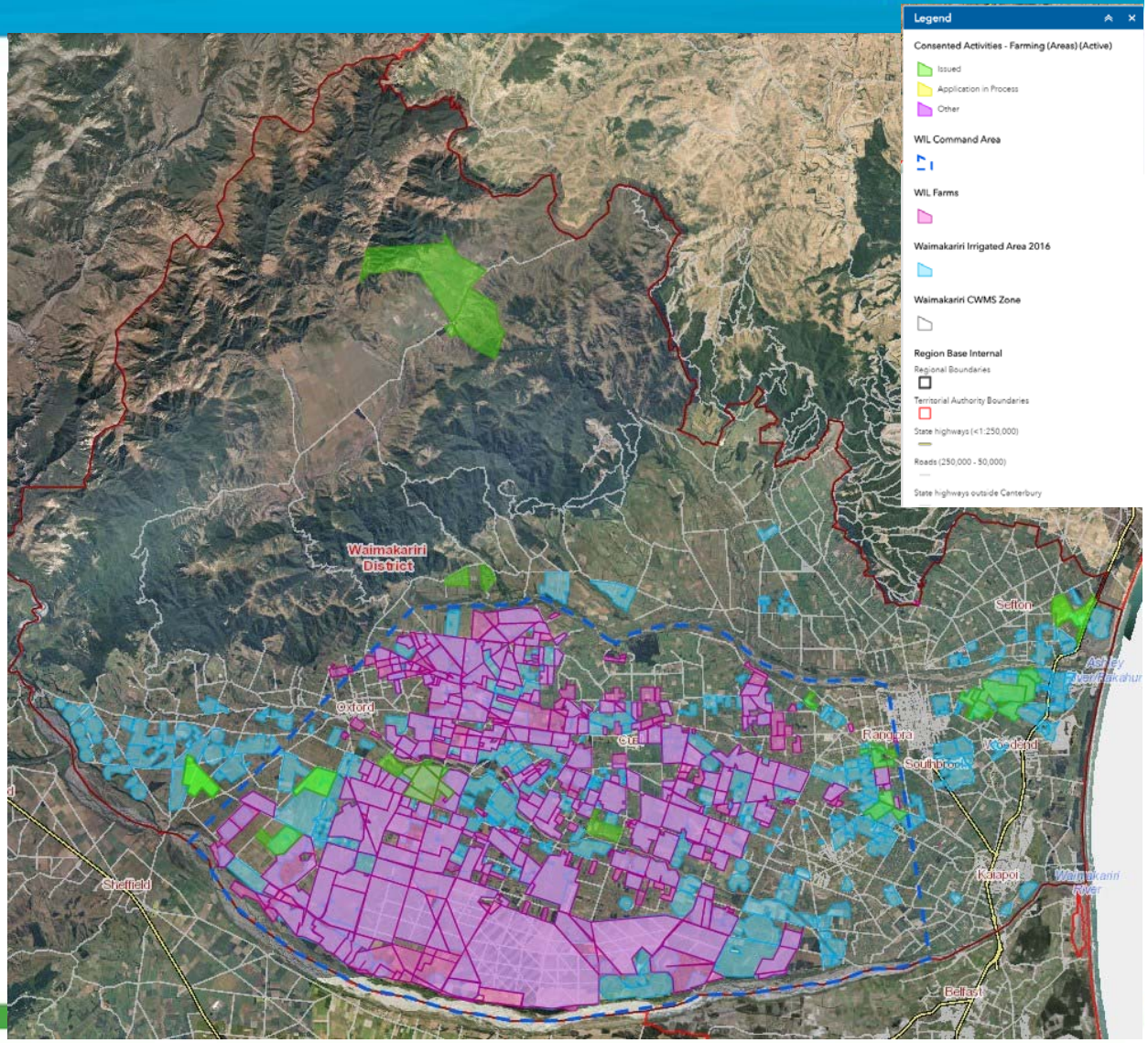
Waimakariri Zone

Canterbury Water

LU Consents to farm

- *Green areas consents granted*

- *Plus 3 applications in-process (as @ 21 Sept - not showing)*



26

Waimakariri Zone

Canterbury Water

Farming @ GMP campaign

Stage 1 progress

67 farms → >50ha / non-WIL

- Step 1 phone calls, emails etc
  - 40 contacted
  - @ 7 July – estimate 21 need consent

Dairy	B+S	Poultry	Arable	Unclass	TOTAL
11	7	1	1	2	**22**

- Step 2 LMA-follow-up with 27

Dble-ups	WIL	Applications submitted	Preparing info	Yet to hear back	Assoc with another property	No consent needed	Still to contact	TOTAL
5	3	2	6	1	1	5	3	**27**

- Step 3 Review progress early Nov

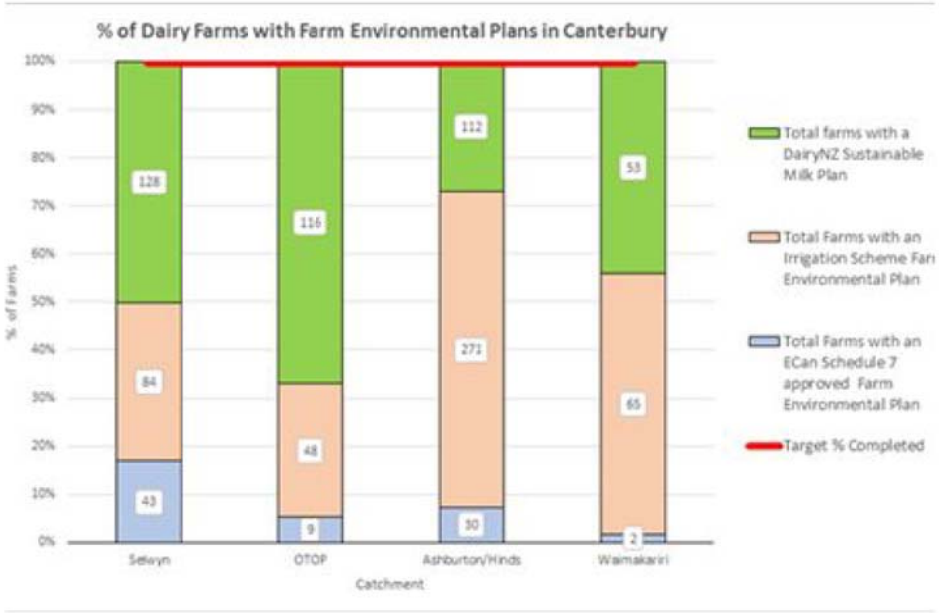
27

Waimakariri Zone

Canterbury Water

Dairy Updates

- DairyNZ – FEPs completed
  Target met!



Beef & Sheep

- 4 - 5 FEP workshops over last 2 yrs
- estimate ±40 Waimakariri farmers attended

28

WAIMAKARIRI DISTRICT COUNCIL

REPORT

FILE NO and TRIM NO:	DRA-21 / 171012110892
REPORT TO:	Council
DATE OF MEETING:	24 October 2017
FROM:	Greg Bennett, Land Drainage Engineer
SUBJECT:	CAREX report on glyphosate
SIGNED BY: **(for Reports to Council or Committees)**	

Department Manager | Chief Executive

1. SUMMARY

1.1. The purpose of this report is to present the CAREX report entitled "Persistence and ecological consequences of glyphosate to control aquatic weeds in Waimakariri lowland waterways".

1.2. The aims of this study were to investigate the persistence of glyphosate in the stream water and sediment following spraying and the effect of glyphosate on the freshwater invertebrates and fish in sprayed waterways.

1.3. The work found that glyphosate was present in the water column for 1-2 days following spraying, but quickly bound to sediment and broke down. It also found that Freshwater invertebrates and fish were not affected by the use of glyphosate to control emergent macrophytes.

Attachments:

i. Persistence and ecological consequences of glyphosate to control aquatic weeds in Waimakariri lowland waterways. TRIM 171011110252
ii. Environmental Protection Authority About Glyphosate Information Sheet TRIM 171012110889
iii. Glyphosate 510 Label TRIM 171012110888

2. RECOMMENDATION

THAT the Council:

(a) **Receives** report No. 171012110892.

(b) **Notes** that CAREX study did not detect any short term effect of glyphosate on freshwater invertebrates and fish following spraying of waterways.

(c) **Notes** that a follow up report on the wider use of glyphosate by Council and future maintenance provisions will be presented to Council as part of the LTP process.

(d) **Circulates** this report to the Community Boards, Drainage Advisory Groups and the Waimakariri Water Zone Committee for their information.

3. ISSUES AND OPTIONS

3.1. The Council at its meeting on the 6th of September 2016 (TRIM 160929100894) made the following resolutions:

THAT the Council:

(a) **Receives** report No. 160805077062.

CARRIED

(b) **Notes** the responses to a Council request for information on the effects of use of glyphosate on public health and the environment from the Environmental Protection Authority (TRIM 160812081280), Ministry of Health (see TRIM 160815081517) and Ministry for the Environment (160823085124).

CARRIED

Against Councillor Atkinson

(c) **Notes** the report by Dr Wayne Temple, commissioned by the Environmental Protection Authority on "*Review of the Evidence Relating to Glyphosate and Carcinogenicity, published August 2016"* concluded that **"***based on a weight of evidence approach, taking into account the quality and reliability of the available data – glyphosate is unlikely to be genotoxic or carcinogenic to humans and does not require classification under HSNO as a carcinogen or mutagen".*

CARRIED

Against Councillor Atkinson

(d) **Notes** that based on the information received to date, it is unlikely that the use of glyphosate by the Council would pose a risk to public health and the environment.

LOST

(e) **Notes** the CAREX study in the Cust Main Drain and tributary drains proposes to collect stream bed sediment and water chemistry samples and undertake fish and invertebrate population counts pre and post glyphosate spraying to assist to identify any effects of glyphosate on the distribution of aquatic species in the study reach.

CARRIED

(f) **Notes** that Council spraying programmes using glyphosate will continue at locations where this was previously used and the programme will be reviewed again pending receipt of further advice from the Parliamentary Commissioner for the Environment and results of the CAREX study.

CARRIED

Against Councillors Atkinson, Faass, Meyer

(g) **Requests** staff prepare a further report on the following: 1) results of the CAREX trial; 2) any further advice from the Parliamentary Commissioner for the Environment.

CARRIED

(h) **Circulates** this report to the Kaiapoi, Rangiora and Woodend-Ashley Community Boards and the Oxford Eyre Ward Advisory Board and the Waimakariri Water Zone Committee.

CARRIED

3.2. The CAREX report and this cover report is in response to the request (g) above.

3.3. The Parliamentary Commissioner for the Environment acknowledged the request for information regarding glyphosate but no other correspondence has been received.

3.4. In response to the Council's request on the 6th of September 2016 the Waimakariri District Council partnered the Canterbury Rehabilitation Waterway Experiment (CAREX) in a trial to understand the persistence of glyphosate in stream water and sediment and its short-term effects on freshwater invertebrates and fish following spraying of waterways.

3.5. The trial was conducted over the summer of 2016 – 2017 along five different waterways within the Waimakariri District. In each waterway an upstream reach was left as an unsprayed control and a downstream reach was sprayed. Water quality, macroinvertebrate and fish samples were collected in each reach before and after spraying. The CAREX Report presents the findings of this trial.

3.6. The work found that:

3.6.1. Glyphosate was present in the sediment before spraying had even started.

3.6.2. Glyphosate was present in the water column for 1-2 days following spraying, but quickly bound to sediment and broke down.

3.6.3. Freshwater invertebrates and fish were not affected by the use of glyphosate to control emergent macrophytes.

3.7. It was concluded that as these drains are highly modified environments, invertebrates and fish that continue to occupy them are tolerant of water quality in these systems.

3.8. A previous report titled; Professional Opinion on the Impact of Glyphosate on the Kaiapoi River was presented to Kaiapoi Community Board 20 June 2016 (TRIM 160608053721). This work concluded that it is unlikely that glyphosate has contributed to the die-off of aquatic plants observed in the Kaiapoi River over 2012-2016.

3.9. There have been other concerns regarding the risk of exposure to glyphosate on human health. These concerns are not specifically covered in this report.

3.10. Additional background information on glyphosate is provided as attachments ii and iii.

3.11. A follow up report on the wider use of glyphosate by Council and future maintenance provisions will be presented to Council as part of the LTP process.

3.12. The Management Team has reviewed this report and supports the recommendations.

4. COMMUNITY VIEWS

4.1. The Kaiapoi Community Board at its meeting on the 20th of June 2016 (TRIM 160620057958) recommended the following:

4.1.1. **Recommends** that Council approves the use of mechanical means, rather than spraying, to control weeds in the Council stormwater and roadside drains, and waterways. Notes that mechanical means, rather than spraying Council drains, is estimated to cost an additional $80,000 per year.

4.1.2. **Recommends** that Council declines support for a return to the use of spraying to control weeds in Council drains.

4.2. Kaiapoi resident Michael Bate has been vocal in his opposition to the use of glyphosate making several submissions to the Council and Water Zone Committee. He has distributed flyers and erected billboards.

5. FINANCIAL IMPLICATIONS AND RISKS

5.1. The chemical testing of water samples was funded using existing drainage budgets and cost $13,200.00

5.2. The spraying of the 5 reaches was funded using existing drainage maintenance budgets and cost $1356.60

5.3. The sampling and reporting carried out by CAREX did not incur any cost to the Council.

6. CONTEXT

6.1. Policy

This matter is not a matter of significance in terms of the Council's Significance Policy.

6.2. Legislation

Resource Management Act 1991

Section 31

(1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:

(e) the control of any actual or potential effects of activities in relation to the surface of water in rivers and lakes:

Section 35

i. Every local authority shall gather such information, and undertake or commission such research, as is necessary to carry out effectively its functions under this Act or regulations under this Act.

ii. Every local authority shall monitor (a) the state of the whole or any part of the environment in its region or district;

6.3. Community Outcomes

6.3.1. The air and land is healthy

6.3.2. Core utility services are provided in a timely, sustainable and affordable manner.

6.3.3. There is sufficient clean water to meet the needs of communities and ecosystems

CAREX Canterbury Waterway Rehabilitation Experiment

A project funded by the Mackenzie Charitable Foundation

UC UNIVERSITY OF CANTERBURY Te Whare Wānanga o Waitaha CHRISTCHURCH NEW ZEALAND

Persistence and ecological consequences of glyphosate to control aquatic weeds in Waimakariri lowland waterways

Katie Collins , Jon S. Harding
Corresponding author: carex@canterbury.ac.nz

September 2017

Executive Summary

This study and report was undertaken by researchers from CAREX and no payment was received for this work. Waimakariri District Council paid for commercial analysis of glyphosate and AMPA. The purpose of this study was to understand the persistence of glyphosate in stream water and sediment and its short-term effects on freshwater invertebrates and fish following spraying of waterways.

From December 2016 – March 2017 five waterways near Rangiora were investigated to test the effect of glyphosate on aquatic weeds, stream invertebrates and fish. In each waterway an upstream reach was left as an unsprayed control and a downstream reach was sprayed. Samples were collected in each reach before and after spraying. Glyphosate and AMPA (the product of glyphosate) were already present in the sediment at both the control and spray reaches before spraying even started. This implies that parties other the Council are spraying waterways or nearby areas, and this makes determining the effects of spraying on animal life in these waterways difficult.

Glyphosate and AMPA were present in the water column for 1-2 days following spraying, but glyphosate quickly bound to sediment and broke down to AMPA. Glyphosate and AMPA were still present in the sediment at both the control and spray reaches 14 weeks after spraying. Weeds in the spray reaches were greatly reduced by glyphosate, being reduced from 90% cover to 20%, however 14 weeks after spraying weed cover in these reaches had returned to about 50%. We could not detect any effect of glyphosate on stream invertebrate species richness, metrics such as the MCI and SQMCI or fish. These waterways are highly modified environments, and invertebrates and fish that occupy them are tolerant of water quality in these systems. Given the small sample size (five waterways), the findings of the study are limited and add to our understanding of drain maintenance on aquatic systems.

1. Introduction

Excessive growth of aquatic macrophytes (weeds) is a significant problem in lowland agricultural waterways, including in the Waimakariri District. Management is undertaken by Councils to ensure drainage is maintained, most commonly using mechanical clearance, herbicide spray and hand weeding.

Glyphosate is one of the world's most effective and most frequently used herbicides. It is a non-selective, broad-spectrum herbicide commonly used on emergent (surface dwelling) and marginal (bankside) macrophytes, but following manufacturers instructions, spraying directly on the waterway should be minimised.

Concerns have been raised about the toxic effect of glyphosate on aquatic life. There are also concerns of secondary effects including depleted dissolved oxygen levels and release of nutrients from decomposing plants, and sudden changes in habitat influencing refugia and food sources for aquatic invertebrates and fish.

To respond to public concerns, an investigation was carried out by the University of Canterbury on behalf of the Waimakariri District Council on the use of glyphosate spray to control aquatic macrophytes. This investigation was undertaken between December 2016 and March 2017.

The aims of this study were to investigate:

- the persistence of glyphosate in the stream water and sediment following spraying
- the effect of glyphosate on the freshwater invertebrates and fish in sprayed waterways

2. Methods

2.1. Experimental design

The impact of glyphosate was tested in five waterways. In each waterway an upstream 200m reach was selected which was not sprayed (control reach) and a 200m reach downstream was sprayed (treatment reach). The five waterways were scheduled to be sprayed by the Waimakariri District Council as part of their annual weed control program. They were:

- Ashworths: Ashworths Road Drain, between Mill Road & Main Drain Road
- Ohoka: Ohoka Stream North Branch, between Mill Road & the first gate along the walkway
- Threlkelds: Threlkelds Road, upstream of Main Drain Road
- Easterbrook: Easterbrook Road, upstream of Hicklands Road
- Ashby's: No. 4 Drain, upstream of Hicklands Road

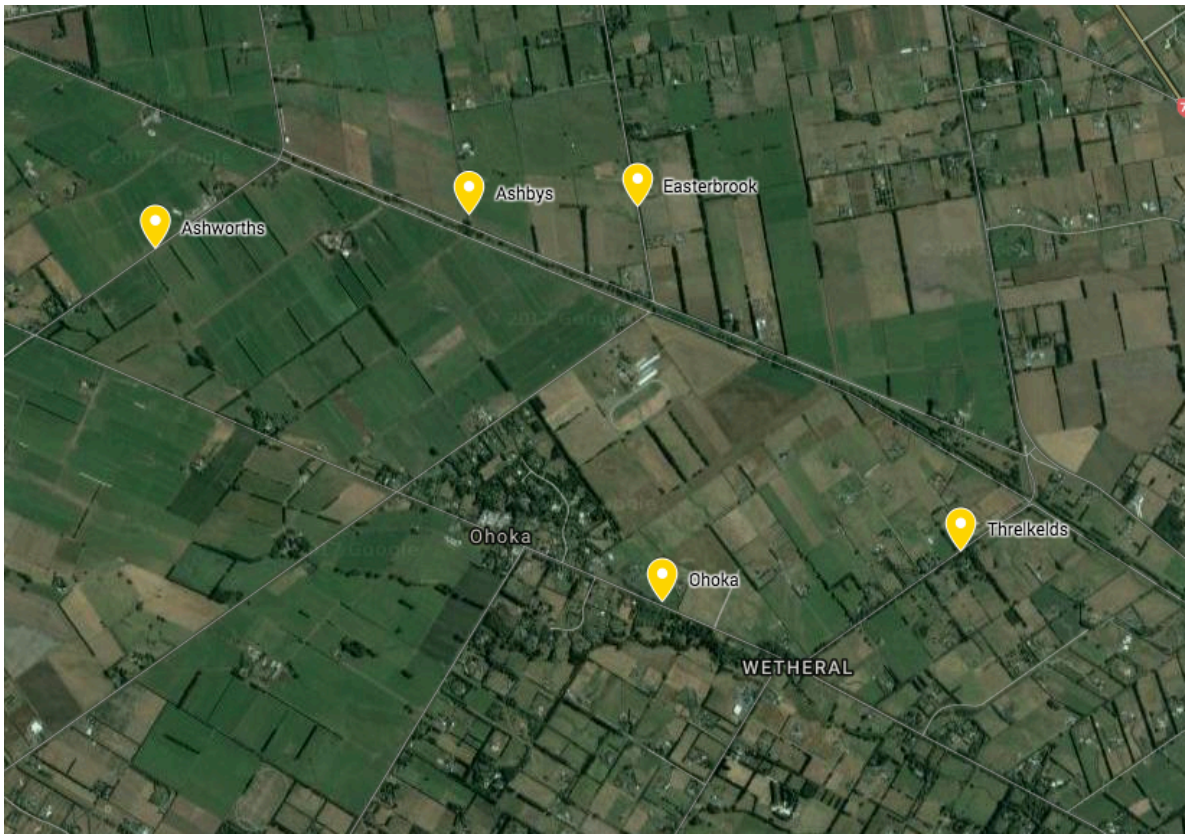


Figure 1: Location of the five waterways used in the spray trial.

A 200m stretch at the top of each reach was left unsprayed as a control reach. Macrophytes were sprayed from the 200m point downstream. Sampling of the control reach was undertaken 100m into the reach, and the spray reach was sampled at 400m (Fig 2).

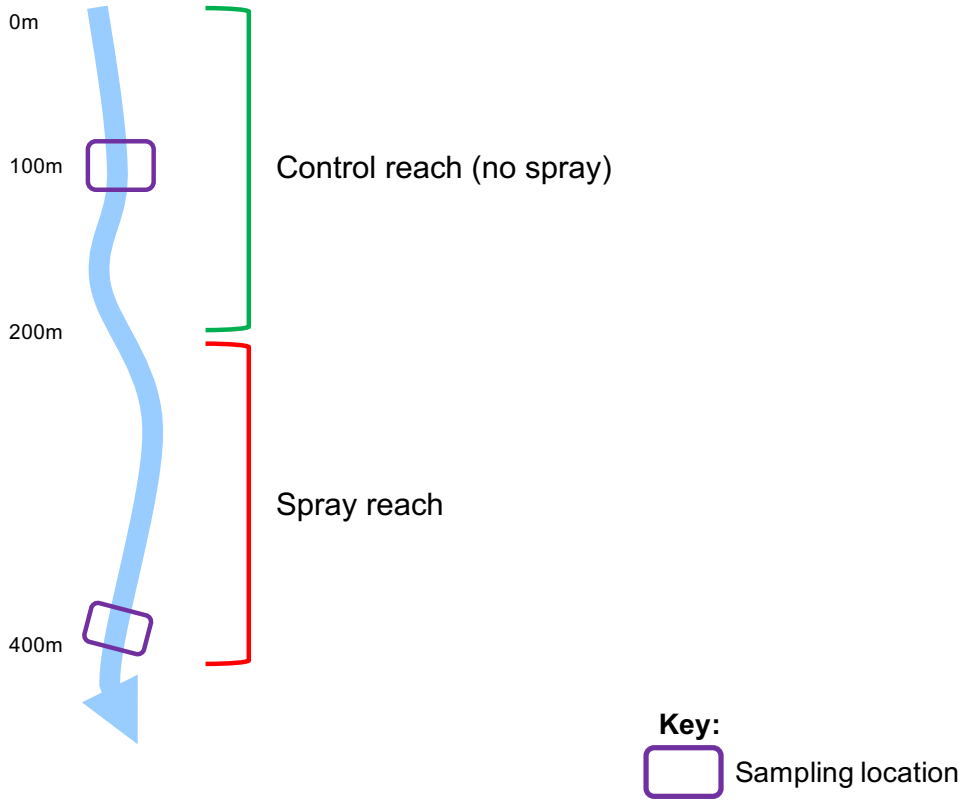


Figure 2: Spray trial experimental design used in all five waterways

Spraying was carried out by the Waimakariri District Council's contractor on 21 December 2016.

2.2. Weed monitoring

At each of the control (100m) and spray (400m) reaches, three macrophyte assessment cross-sections were set up. These cross-sections were measured before the spray trial (pre-spray), and 3, 6 and 14 weeks after spraying (post spray). On each cross-section, aquatic weed species and the height above the water surface were recorded every 10cm across the wetted width of waterway.

2.3. Glyphosate and AMPA sampling of water and sediment

When glyphosate contacts water, there are two major pathways of dissipation: binding to sediments, and microbiological breakdown. When sediments are present glyphosate rapidly binds to soil particles, bacteria and fungi in the water and sediment also breakdown glyphosate into aminomethylphosphonic acid (AMPA). AMPA can remain stable in sediments for some time. We measured both glyphosate and AMPA to better understand the persistence and breakdown time in these streams and sediments.

Glyphosate and AMPA samples of both stream water and stream bed sediment were collected and sent for analysis by AsureQuality (Wellington).

Water samples were collected pre-spray, the day of spraying (both control and spray reaches) and 1 and 5 days post spray (spray reaches only).

Samples of sediment were collected pre-spray (control and spray reaches) and 5 days, 3 weeks (spray reaches only) and 6 weeks post spray (control and spray reaches).

2.4. Aquatic invertebrates

Aquatic invertebrates were collected at both control and spray reaches pre spray, 5 days and 6 weeks after spraying. In each reach a single invertebrate kick-net sample (500 µm mesh) was collected from five representative micro-habitats within the reach using the standard New Zealand protocols (Stark et al 2001). Samples were labelled and stored in 70 % ethanol.

In the laboratory the samples were sieved (500 µm Endecott sieve), and all invertebrates identified to the lowest practicable level (usually genus) using identification guides (such as Winterbourn 2006). Coded abundances of taxa were recorded as described by Stark (1998).

We then calculated several stream health metrics to determine the impact of the spray trial on aquatic invertebrates. The Macroinvertebrate Community Index (MCI) uses the presence or absence of taxa and their tolerance to pollution to indicate stream health. The MCI ranges from 0 – 200, scores of less than 80 indicate a severely polluted system while scores over 120 are considered healthy (Table 1). A second metric called the Semi-Quantitative Macroinvertebrate Community Index (SQMCI) was calculated using the pollution tolerances of taxa present and the coded abundance data. SQMCI's range from 0 – 10. Values less than 4 indicate a severely polluted system while values more than 6 indicate health systems.

Table 1: Interpretation of MCI and SQMCI values.

Water quality	Description	MCI	SQMCI
Excellent	Clean water	> 119	> 5.99
Good	Doubtful quality or possible mild pollution	100 – 119	5.00 – 5.90
Fair	Probable moderate pollution	80 – 99	4.00 – 4.99
Poor	Probable severe pollution	< 80	< 4.00

2.5. Fish sampling

Freshwater fish were sampled with a portable (KAINGA EFM300) electric fishing machine by spot fishing in areas where aquatic weed cover was less than 40%. Electric fishing was undertaken at both control and spray reaches pre spraying and 3, 6 and 14 weeks post spray. However, this was problematic especially prior to spraying as weed cover was extensive and the high weed cover potentially confounded any results. Captured fish were identified to species level where

possible in the field. Very small fry (> 4 cm) were identified to family. Glass eels and elvers (Anguillidae) (>10 cm) were recorded as elvers.

Table 2: Timing of different sample collection over the experimental period.

Days since spraying	**Water samples**		**Sediment samples**		**Macrophyte transects**	**Aquatic Invertebrates**	**Fish**
	Control	**Spray**	**Control**	**Spray**	**Control & Spray**	**Control & Spray**	**Control & Spray**
Pre spray							
Day of spray							
Spray 1 day							
Spray 5 days							
Spray 3 weeks							
Spray 6 weeks							
Spray 14 weeks							

3. Results

3.1. Glyphosate and AMPA in water

Prior to spraying no glyphosate was detected in the water but AMPA was found in water in the control sites. No glyphosate or AMPA were present in the water on the day of spraying at any control (non-sprayed) reaches (Fig 3A & B) whereas both glyphosate and AMPA were present in the water on the day of spraying at all spray (treated) reaches. On the day after spraying, glyphosate was detected in the water at all spray reaches at low concentrations. AMPA was only detectable in the water at the Easterbrook spray reach (Fig 3A & B). Five days after spraying, glyphosate and AMPA were both virtually undetectable in the water at all spray reaches (Fig 3A & B).

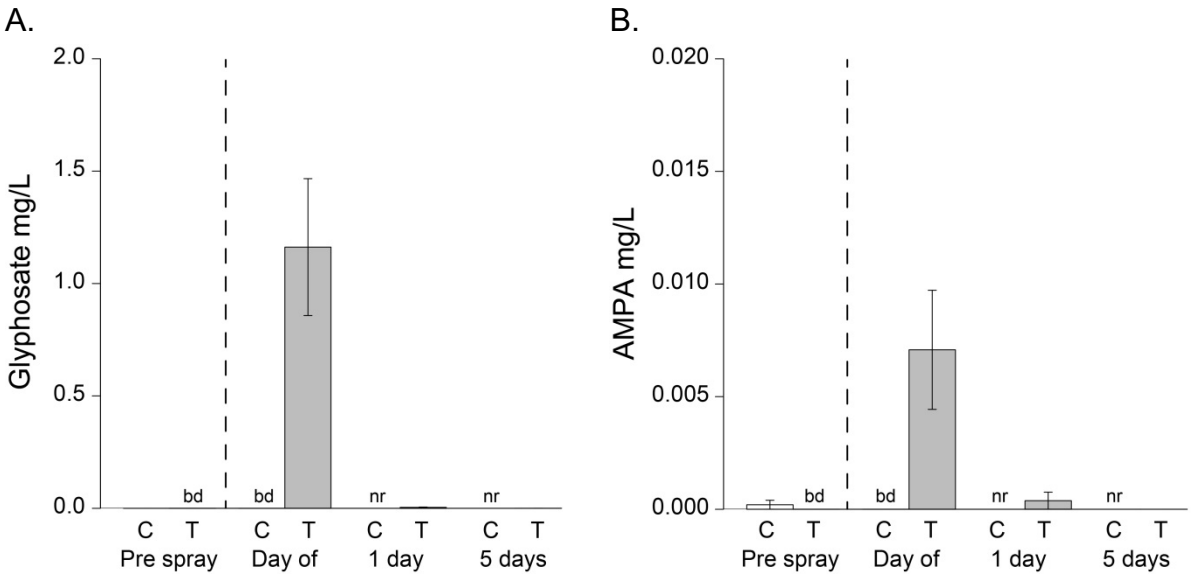


Figure 3: A. Mean glyphosate and B. Mean AMPA concentrations in water pre spraying, on the day of spraying, the day after spraying and 5 days after spraying. Control reaches are shown in white, treated (spray) treated reaches are shown in grey. Time of spraying is indicated by the dotted line. nr = sample not run, bd = sample result below detectable limit. Mean values are shown with ± 1 Standard error.

3.2. Glyphosate and AMPA in sediment

Pre spraying, glyphosate and AMPA were detected in the sediment in both control and spray reaches (Fig 4A & B). Six weeks after spraying, glyphosate and AMPA were still detectable in the sediment in both control and spray reaches (Fig 4A & B).

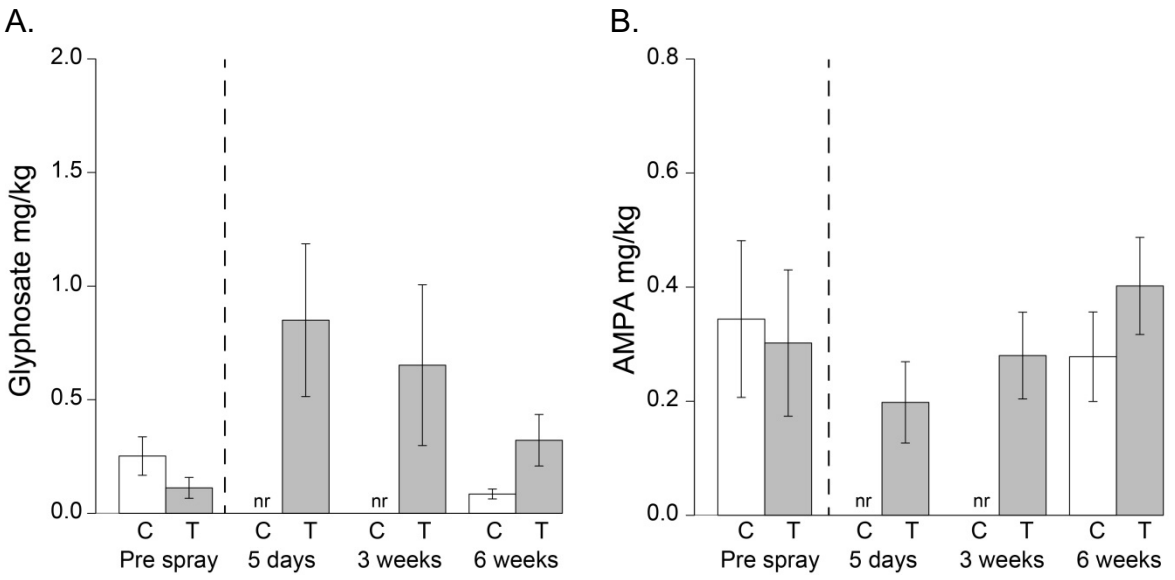


Figure 4: A. Mean glyphosate and B. Mean AMPA concentrations in sediment pre spraying, 5 days after spraying, 3 weeks and 6 weeks after spraying. Control reaches are shown in white, treated (spray) treated reaches are shown in grey. Time of spraying is indicated by the dotted line. nr = sample not run, bd = sample result below detectable limit. Mean values are shown with ± 1 Standard error.

3.3. Aquatic weed cover

Macrophyte cover was between 80 – 100 % pre spraying. Three weeks post spraying, macrophyte cover was greatly reduced in the spray reaches (Fig 5, Photos 1-3). Fourteen weeks post spraying, macrophytes were starting to grow back in sprayed reaches (Fig 5).

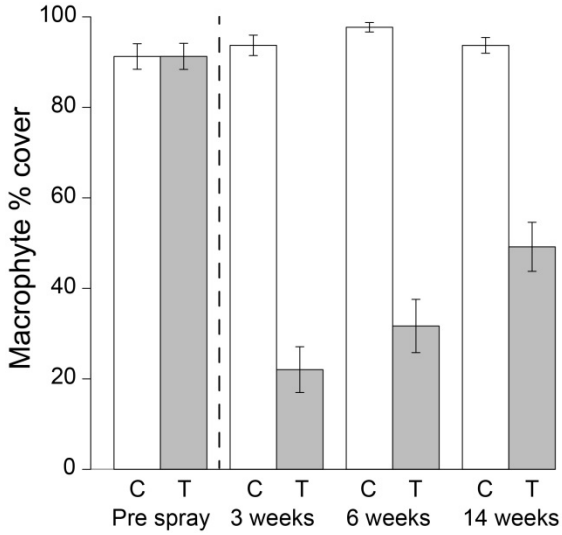


Figure 5: Mean macrophyte percent cover pre spraying, 3 weeks, 4 weeks and 14 weeks after spraying. Control reaches are shown in white, treated (spray) treated reaches are shown in grey. Time of spraying is indicated by the dotted line. Mean values are shown with ± 1 Standard error.

Photo 1: Threlkelds Road site pre spraying

Photo 2: Threlkelds Road control site 3 weeks after spraying

Photo 3: Threlkelds Road spray site 3 weeks after spraying

3.4. Invertebrate species richness, MCI and SQMCI

We compared mean values for invertebrate species richness, MCI and SQMCI and found no difference, suggesting these communities are not affected by the presence of glyphosate in the water or sediment (Fig 6A, B & C). MCI and SQMCI scores at all sites indicated probable moderate levels of pollution.

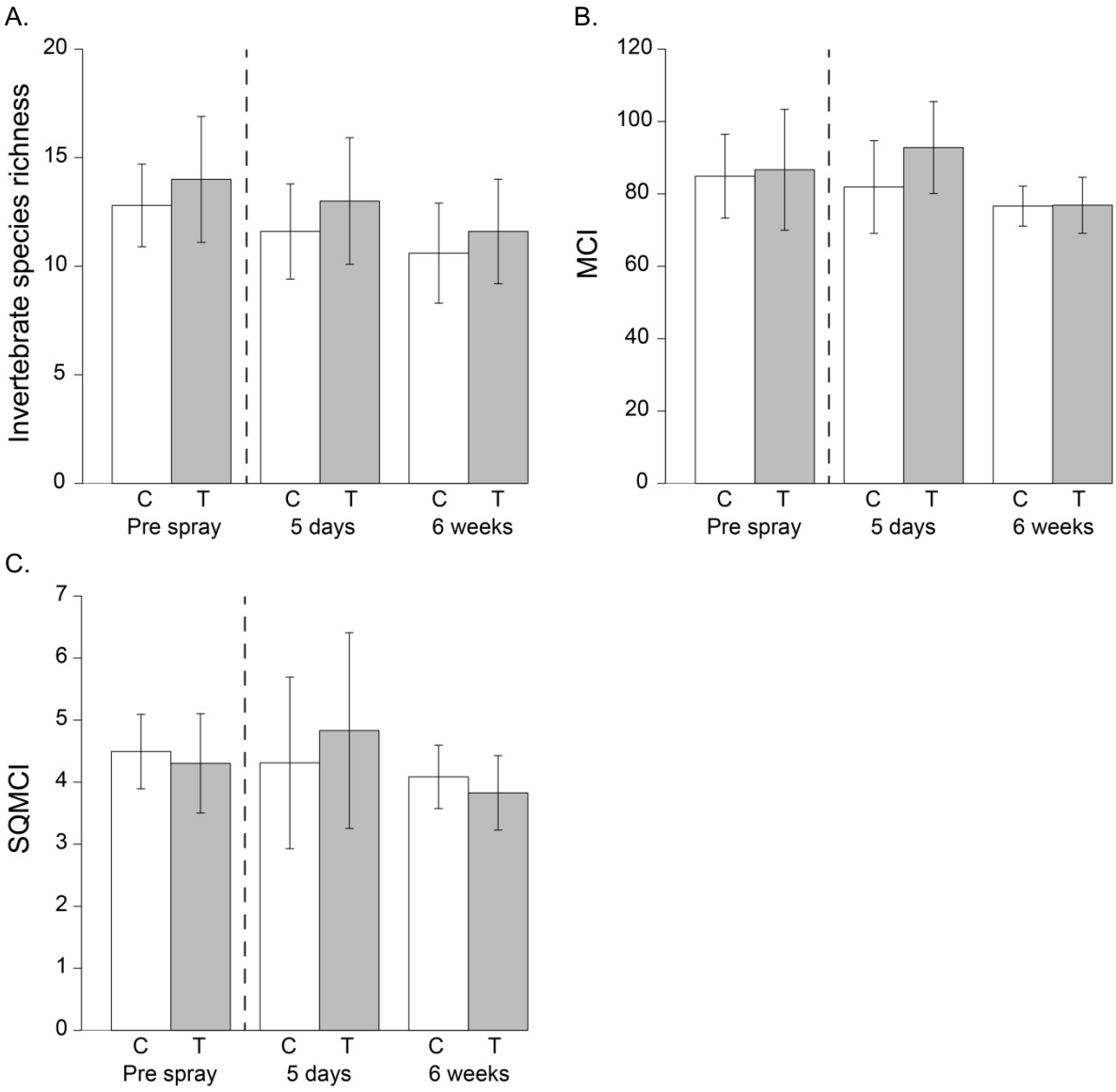


Figure 6: A. Mean invertebrate species richness, B. MCI and C. SQMCI pre spraying, 5 days and 6 weeks after spraying. Control reaches are shown in white, treated (spray) treated reaches are shown in grey. Time of spraying is indicated by the dotted line. Mean values are shown with ± 1 Standard error.

3.5. Fish species richness

Five fish species were observed in the five waterways, including: upland bullies (*Gobimorphus breviceps*), common bullies (*Gobimorphus cotidianus*), shortfin eels

(*Anguilla australis*), one longfin eel (*Anguilla dieffenbachii*) and juvenile brown trout (*Salmo trutta*).

Post spraying no differences were observed in fish species richness despite a declining trend. It seems unlikely individual fish species were directly impacted (Fig 7). Unfortunately, the high weed cover made accurate fish data difficult to collect.

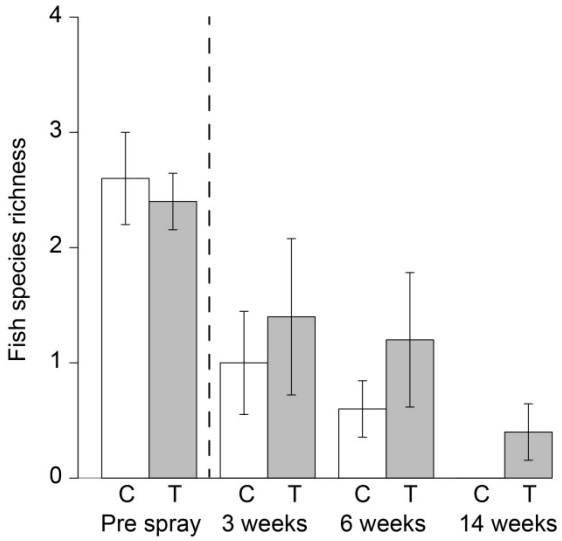


Figure 7: Mean fish species richness pre spraying, 3 weeks, 6 weeks and 14 weeks post spraying. Control reaches are shown in white, treated (spray) treated reaches are shown in grey. Time of spraying is indicated by the dotted line. Mean values are shown with ± 1 Standard error.

4. Final comments

- The purpose of this study was to understand the persistence of glyphosate in stream water and sediment and its short-term effects on freshwater invertebrates and fish following spraying of waterways.
- Glyphosate and AMPA were present in the water column for 1-2 days following spraying, but glyphosate quickly bound to sediment and broke down to AMPA
- Glyphosate and AMPA were already present in the sediment at both the control and spray reaches before spraying even started.
- Glyphosate and AMPA were still present in the sediment at both the control and spray reaches 14 weeks after spraying
- Spraying with glyphosate is an effective way to control aquatic weeds, however effectiveness is short lived and grow back is evident within three months
- Species richness of invertebrates and fish, MCI and SQMCI are not affected by the use of glyphosate to control emergent macrophytes. These drains are highly modified environments, and invertebrates and fish that continue to occupy them are tolerant of water quality in these systems.
- Glyphosate is commonly used for domestic purposes on lawns and gardens, and in agricultural landscapes. There are several ways it can enter waterways, including spray drift and direct runoff from sprayed land.
- This study was not designed to detect the sources of glyphosate in these stream systems. Our results show that either: glyphosate can persist in these systems between periods of drain maintenance, or the glyphosate in the system prior to commencement of this study was from other nearby sources.

5. Acknowledgements

This work would not have been possible without the field assistance of Hayley Devlin, Nicky Glenjarman, Will Keay, Alice West, Catherine Febria, Tina Clapham and Sarah and Nick Collins.

Thank you to Greg Bennett and the Waimakariri District Council for the support of this research, and to the District-appointed contractors who executed the spraying contract.

The glyphosate data presented here were paid for by the Waimakariri District Council.

Environmental Protection Authority
Te Mana Rauhī Taiao

INFORMATION SHEET

About glyphosate

Glyphosate is a chemical used to control weeds. It is a broad-spectrum herbicide that works by inhibiting an enzyme found in plants. Glyphosate-containing substances are perhaps the most common herbicides in New Zealand and world-wide, and are used commercially and around the home. The Environmental Protection Authority (EPA) has approved glyphosate for use in New Zealand.

The use of glyphosate in New Zealand

Glyphosate substances are used in a wide variety of settings, including orchards, vineyards, pastures, vegetable patches, roadways, parks, sports grounds and home gardens. Glyphosate has been used in New Zealand since 1976 and is currently sold under a large number of different brand names.

Under the Hazardous Substances and New Organisms (HSNO) Act 1996, all hazardous substances, such as glyphosate, require approval by the EPA before they can be used in New Zealand. The EPA has approved approximately 60 substances containing glyphosate under this Act.

The Ministry for Primary Industries' Agricultural Compounds and Veterinary Medicines (ACVM) Group had active registrations for 89 glyphosate products under the ACVM Act as of 1 June 2015. (Note: a single HSNO approval can cover more than one ACVM registered product.)

The safety of glyphosate

Based on the EPA's current assessment, people are advised that following the label instructions on all glyphosate products provides adequate protection for users. People should follow the use and safety instructions on all chemical product labels, as these are designed to reduce human exposure to the product and to protect the environment. If the label has been removed or damaged, you can search the manufacturer's website to find the relevant safety information.

How the EPA balances the risks and benefits of glyphosate

The EPA monitors international developments and the latest research available through a wide range of scientific media. In addition to deciding on applications under the HSNO Act to import and manufacture hazardous substances, the EPA also reassesses existing substances to take into account new information.

Reassessments may be initiated by the EPA or by external parties and anyone can apply to have a substance reassessed or reviewed. You can find further details about this on our website.

All glyphosate substances used in New Zealand have been through an approval process, which considers likely impacts on human health and the environment. To reduce the risks posed by glyphosate, we recommend you follow the advice below.

Protect yourself, others, and the environment

Many chemicals we use every day in New Zealand can pose a risk to people or the environment. You can protect yourself, others, and the environment by following the recommendations for using and storing glyphosate.

Using glyphosate safely

When using any chemical, you should start by reading the label. This will tell you the specific risks for the product, and how you can reduce these risks. There are some practices that you should follow any time you use glyphosate:

Before you spray

- Read all instructions on the label and follow them.
- Make sure you are using the right product for the job you are doing.
- Confirm your spray area is not close to water, such as streams, rivers, lakes or ponds.
- Check the weather forecast. Make sure no rain is predicted for at least 24 hours. Avoid spraying when it is windy.
- Clear children and pets from the area, and keep them well away.
- Follow the label advice on the need for protective clothing.

After spraying

- Wash your hands, face and clothing.
- Keep children and pets away until the spray has dried, or for the amount of time indicated on the label.
- Read the instructions on the label to help you safely dispose of any unused product.

Storing glyphosate safely

You should follow these simple recommendations to protect yourself, others, and the environment:

- Keep it locked up and out of reach of children and pets.
- Store the product in its original container.
- Make sure it is kept far away from food, including pet food.
- Dispose of empty herbicide containers and unused herbicides properly.
- Check the label instructions and use-by date before each re-use.

Where can I find out more about glyphosate?

If you need more information, please call 0800 HAZSUBS (0800 429 7827) or email: hazardous.substances@epa.govt.nz.

WARNING
KEEP OUT OF REACH OF CHILDREN
ECOTOXIC

AGPRO

GREEN GLYPHOSATE 510

NON-RESIDUAL HERBICIDE

Active Ingredient: 510g/litre glyphosate as the isopropylamine salt in the form of a soluble concentrate.

NET CONTENTS: 20 Litres
Batch No:
Date of Manufacture:
HSNO Approval number: HSR007811
Registered pursuant to the ACVM Act 1997 No. P5306
See www.nzfsa.govt.nz/acvm for registration conditions.

Registered to and distributed by:
AGPRO NZ LTD
PO BOX 58-963, GREENMOUNT
10 POLARIS PLACE, EAST TAMAKI
AUCKLAND
PH 0-9-273 3456
FAX 0-9-273 3457
Web: www.agpro.co.nz

PRECAUTIONS:

- Store in the original unopened container in a cool dry place, avoiding sunlight and away from foodstuffs and drink containers.
- Do not eat, drink or smoke while using.
- Remove protective clothing and wash hands and face thoroughly before meals and after work.
- Wash protective clothing after work.
- Avoid contamination of any water supply with chemical or empty container.
- Avoid contact with eyes and skin.
- Avoid inhalation of spray mist.
- Toxic to aquatic organisms.

FIRST AID:
• If swallowed do NOT induce vomiting.
• For advice contact National Poisons Centre (0800 POISON 764-766) or a doctor immediately
• If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.
• If splashed in eyes, wash out immediately with water.

READ PRECAUTIONS BEFORE OPENING
READ THE DIRECTIONS FOR USE BEFORE USING THIS PRODUCT.

GENERAL INSTRUCTIONS
AGPRO GREEN GLYPHOSATE 510 is a non-selective herbicide. It is absorbed by plant foliage and greenstems and is translocated through the plant from point of contact into the root system. The effects of AGPRO GREEN GLYPHOSATE 510 may not be apparent for 4-7 days depending on weather conditions, weed species and the herbicide use rate. Some perennial weeds may not show effects for 10-20 days.
There is no withholding period for AGPRO GREEN GLYPHOSATE 510. Avoid grazing weeds after spraying for 3 days if treating annual weeds or 7-10 days if treating

perennial weeds, to allow translocation of this product through the weeds.

SPRAY DRIFT WARNING:

Beware: Apply this product carefully. Spray drift may cause serious damage to other desirable plants. Do not apply under weather or spraying conditions which would be expected to cause spray drift onto nearby crops and susceptible plants.

RECOMMENDED USES

Agricultural Areas: Used to control a wide range of annual and perennial weeds prior to sowing crops or pastures. See Weed Control Chart.

Asparagus: May be used to control weeds prior to planting or crop emergence and in established plantings provided herbicide contact with any part of the asparagus plant is avoided through the use of shielding or weed wiping equipment. See Weed Control Chart.

Aquatic Areas: May be used in drains and waterways. See Weed Control Chart.

Broad-acre Crops: Used to control a wide range of weeds prior to cultivation of barley, oats, peas, and wheat. For best results do not disturb sprayed weeds by cultivation for 3 days after spraying for annual weeds and 7 days after cultivation for perennial weeds. See Weed Control Chart.

Brushweeds: A wide range of brushweeds are controlled by this product. Always use AGPRO

Organosilicone when treating brushweeds. See Weed Control Chart.

Forestry: May be used to control a wide range of brushweeds and grasses. See Weed Control Chart.

General Weed Control: Used in a wide range of situations to control weeds. Use 1 litre in 100 litres of clean water and ensure the foliage is well covered. See Weed Control Chart.

Market Gardens: May be applied to control weeds before or after seeding, but prior to crop emergence. See Weed Control Chart.

Non-agricultural Areas: Used to control weeds. See Weed Control Chart.

Orchards: May be used for weed control in apple, pear, citrus, grape, stone and berryfruit growing provided any herbicide contact with the trees is avoided. See Weed Control Chart.

Pasture: Used as a spot application to control a wide range of weeds. See Weed Control Chart. Existing pasture may be treated with this product prior to the sowing of new pasture or crops.

Other Uses: May be used as a spot application to control weeds in lawns, parks, reserves and ornamentals.

MIXING PROCEDURES

Spray tanks should be free of any previous spray chemicals. A suitable tank cleaning agent is recommended. Half fill spray tank with clean water, add the required amount of AGPRO GREEN GLYPHOSATE 510 then fill with clean water. Add surfactant last. Agitate well before spraying. When tank mixing with other compatible chemicals add AGPRO GREEN GLYPHOSATE 510 after other water soluble products, but before flowables.

IMPORTANT

AGPRO GREEN GLYPHOSATE 510 should only be stored and applied in plastic or plastic lined containers, aluminium, brass, copper, stainless steel or fibreglass containers. The contact of AGPRO GREEN GLYPHOSATE 510 with unlined or galvanised steel may cause a highly flammable gas to form causing an explosion if ignited by an open flame etc.

SURFACTANT ADDITION
The addition of a surfactant is not generally needed with this product, except when water volumes exceed 50 litres/ha. In this case add a 100% non-ironic surfactant, such as AGPRO Wetter/Penetrant at label rates.

TANK MIXTURES
AGPRO GREEN GLYPHOSATE 510 can be tank mixed with DICAMBA 20% ai for improved control of clover. For knockdown and residual control AGPRO GREEN GLYPHOSATE 510 can be tank mixed with AGPRO SIMAZINE 500. Observe the Directions of Use Table and crops suitable on the respective label. Do not apply tank mix by air.

APPLICATION
A. BOOM SPRAY EQUIPMENT: A spray volume of 25-120 litres/ha is recommended. Ensure a double overlap of nozzle patterns at the top of the weed canopy.
NOTE: Fan nozzle equipment should be used at pressures in the range 240-280kPA.
B. AERIAL APPLICATION: AGPRO GREEN GLYPHOSATE 510 may be aerially applied in pasture or fallow situations prior to establishment of field crops or new pasture. Apply in spray volumes of 15-80 litres/ha. Increased spray volumes should be used in difficult situations such as mountainous areas and hilly terrains. This will ensure adequate crop coverage. DO NOT use in intensive horticultural areas.

APPLICATION PROCEDURE IN HOT CONDITIONS
It is recommended that when the temperature reaches 24-26 degrees C, increase water volume to at least 30-35 litres/ha and increase droplet size to at least 300 micron VMD. Aerial application is not recommended at temperatures above 32 degrees C.

WASHING AND CLEANING OF EQUIPMENT
Take careful precautions with regard to the washing of all spray equipment after each day of spraying. Spray tanks, pumps, lines and nozzles should be thoroughly rinsed with clean water following application to prevent corrosion. Aircraft should be thoroughly washed, especially landing gear, after each day of spraying.

CONTAINER DISPOSAL:
Triple rinse container and add residue to spray tank. Burn in an appropriate incinerator, if circumstances such as wind direction permit. Otherwise crush or puncture and bury in a suitable landfill, or if appropriate, recycle.

SHELF LIFE:
When stored appropriately, this product should show no significant degradation for two years from the date of manufacture. Contact your supplier for further information about the use of any product that is older than this.
COMPATIBILITY: Compatible with most commonly used herbicides.

CONDITIONS OF SALE:
The use of AGPRO GREEN GLYPHOSATE 510 being beyond the control of the manufacturer, no warranty expressed or implied is given by AGPRO NZ LTD regarding its suitability, fitness or efficiency for any purpose for which it is used by the buyer, whether in accordance with the directions or not and AGPRO NZ LTD accepts no responsibility for any consequence whatsoever resulting from the use of this product.

WEED CONTROL CHART - Application Rates

WEEDS	BOOMSPRAY Per HA	HANDGUN Per 100L	WATER KNAPSACK Per 15L WATER	CRITICAL COMMENT
Annual Weeds	700ml - 1.4L	140ml	20ml	Apply at the higher rate for larger weeds. May be tank mixed with AGPRO Simazine 500 for longer term control. Do not spray plants stressed due to low moisture levels, frost, waterlogged or covered with dust.
Australian Sedge	4.2L	700ml	110ml	Apply to actively growing weeds only, usually November to March. For aerial application increase the rate to 6.3L/ha. Dense growth should be burnt 12-18 months prior to treatment.
Barberry	—	700ml	110ml	Apply from flowering to late fruit stage, usually January to April. If bushes have been cut, regrowth should reach 1.5 before spraying
Barley Grass	700ml	140ml	20ml	Apply to actively growing weeds only.
Blackberry	6.3 - 14L	700ml - 1.1L	110 - 140ml	Should be applied between January-May ie from flowering to leaf fall. See that the plants are not under stress. Use of CDA equipment is not recommended. Complete spraying of foliage cover is essential for total control. Use the higher rate on old, dense infestations over 1.75m high.
Boxthorn	—	700ml	110ml	Do not spray in dry conditions. Complete spraying of the foliage cover is essential for total control. The use of CDA equipment is not recommended.
Bracken	6.3L	700ml	160ml	Bracken should be slashed in the winter or early spring. Then prior to frosts, apply in March- May to actively growing fronds. It may be necessary to repeat treatment in conjunction with pasture improvement for permanent control. Add AGPRO Organosilicone at 250ml per 100L of spray to achieve good control.
Broom	6.3L	700ml	110ml	Best results are obtained when plant is in full leaf. (Late spring to early summer). Add AGPRO Organisilicone at 250ml/100L (aerial application), 200ml/100L (Handgun), 20ml/15L (Knapsack) to achieve good control.
Browntop	2.1L	500ml	70ml	Apply at early head stage to actively growing plants.
Buddleia	6.3L	700ml	110ml	Apply to actively growing plants. Spray before the seedheads have formed (late spring to early summer) for best results.
Californian thistle	2.8L	700ml	110ml	Apply to actively growing plants after development of flower buds.
Couch	4.2L	700ml	110ml	Apply to actively growing plants at early head stage.
Dock	2.8—6.3L	700ml	110ml	Use the higher rate for larger plants. Apply to actively growing plants in full leaf. Dicamba 20% ai can be added at label rates to improve control.
Floating sweet grass & Reed sweet grass	6.3L	700ml	140ml	Apply to actively growing plants in late summer (Feb-March) and before the onset of frosts. Not more than one quarter of the plant should be submerged at the time of treatment.
Gorse	—	700ml	—	Handgun application only. Use AGPRO Organosilicone at 200ml/100L or poor results will occur. Spray plant to ensure complete coverage. Apply at any time of the year. Re-treat as required as regrowth may occur after 12 months.
Indian doab	6.3L	700ml	110ml	Apply to actively growing plant at early seedhead stage.
Johnson grass	4.2L	700ml	110ml	Apply at early head stage to actively growing plants
Kikuyu	4.2L	700ml	110ml	Apply to actively growing plants.
Mercer grass-aquatic	6.3L	1.1L	110ml	Apply to actively growing plants in late summer (Feb - March)
Mercer grass-non-aquatic	4.2L	700ml	75ml	No more than one quarter of the plant should be submerged at the time of treatment
Old Man's Beard	—	700ml- 1-4L	200ml	Use the higher rate on plants with stem diameters greater than 1cm. If it is not possible to obtain complete coverage, cut the plant in winter and spray when the plant is over 0.5 m long, using the higher rate. Apply November to March.
Pampas grass/Toetoe	—	700ml	110ml	Apply Spring to Autumn. Ensure complete coverage of the foliage. Do not spray while the plant is flowering.
Paspalum	4.2L	700ml	110ml	Apply to Paspalum at early head stage. Apply to actively growing plants.
Prairie grass	700ml - 1.4L	140ml	20ml	Apply to actively growing plants at seedhead stage.
Ragwort	4.2L	700ml	110ml	Apply to actively growing plants with sufficient leaf area for herbicide uptake,. Keep stock out until the treated plants brown-out.
Ring Fern	700ml - 2.1L	210ml	35ml	The higher rate should normally be used for control. Use 700ml-1.4L/ha only for Pasture Manipulation, increasing the rate to 2.1L/ha for dense infestations.
Ratstail	3.5L	—	—	Apply to actively growing plants at seedhead stage.
Rautahi (Cutty grass) & Rushes	4.2L	700ml	110ml	Apply to actively growing plants, usually January to March.
Ryegrass	1.1 - 2.1L	350ml	50ml	Use AGPRO Organo-silicone at 100ml/100L or poor results will occur. Apply when plants are actively growing. Use the lower rate from January to July before cultivation and the higher rate from August to December.
Tall fescue	4.2L	700ml	110ml	Apply to actively growing plants usually January to March.
Willow	6.3L	700ml	—	Apply to actively growing plants and spray to ensure the foliage is well covered.

AGENDA ITEM NO: 4	SUBJECT MATTER: WAIMAKARIRI WATER MANAGEMENT ZONE COMMITTEE RANGIORA NETWORK CONSENT UPDATE
REPORT: Rangiora Stormwater Network Discharge Consent Application	**DATE OF MEETING:** 13 November 2017
REPORT BY: Janet Fraser, on Behalf of Waimakariri District Council	**ENDORSED BY:** Gerard Cleary, Manager Utilities and Roading

Purpose

This paper updates the Waimakariri Water Management Zone Committee on progress preparing the Rangiora Stormwater Network Discharge Consent Application.

A power point presentation will be provided during the meeting to further update the Committee on the application's content.

The consent application is being finalised and will be shortly lodged with Environment Canterbury, including any feedback provided at this meeting.

Requirement for Discharge Consents

The Rangiora consent application is a requirement of the Canterbury Land and Water Regional Plan (CLWRP). The CLWRP requires the Council as network operator to obtain consent for all reticulated stormwater system discharges into the receiving environment (land and water) in the District. All applications must be lodged with Environment Canterbury by 30 June 2018.

The Rangiora stormwater consent application will be the first "network", or comprehensive consent application to be lodged for existing urban stormwater discharges in the Waimakariri District. The agreements reached with Environment Canterbury through the processing of this application will provide a template for the preparation of applications for the other major towns in the district.

Term and Approach

The Rangiora Stormwater Network Discharge Consent is sought for a term of 25 years.

During the period from 2018 to 2025 the Council will continue to implement network capacity upgrades in Rangiora so as to avoid flooding of dwellings in a 50 year Average Recurrence Interval (ARI) rainfall event. Over this period, staff will develop a comprehensive stormwater management plan to determine how the Council will achieve CLWRP water quality targets for all the Rangiora stormwater network discharges.

The remaining 15 - 20 years of the consent are to implement the water quality improvements identified in the comprehensive stormwater management plan. The Council's target is to ensure discharges from the Rangiora stormwater network comply with all applicable plan standards by 2040.

Stormwater Management Plan

An interim stormwater management plan has been prepared by staff and will be lodged with the consent application.

This plan includes proposed investigation and trial of various methods to improve water quality discharging from the Rangiora stormwater network. Some of the investigations proposed in the interim plan are currently underway. The monitoring programme for the Rangiora stormwater

network is also underway at present and initial samples have also been collected from stormwater discharges from the other major district towns. Some of the key proposals in the interim plan include:

- Investigate source control options for identified contaminants.
- Investigate low impact design options to improve treatment at a sub-catchment level.
- Where practicable, incorporate measures to improve stormwater treatment as part of the capital works programme.
- Phase in use of pollution prevention plans to manage discharges from medium risk premises.

(Note: Discharges from high risk premises into the network are intended to continue to be controlled by Environment Canterbury).

Key Contaminant Findings

The power-point presentation will include water quality monitoring results for the Rangiora stormwater network and receiving environment. Latest results are currently being collated to include in the presentation.

Baseline monitoring shows the key urban source contaminants to be addressed in the consent application are discharges of sediment, dissolved copper and dissolved zinc.

Te Ngai Tūāhuriri Rūnanga – Cultural Impact Assessment

A Cultural Impact Assessment has been completed by Mahaanui Kurataiao on behalf of Ngai Tūāhuriri. Key recommendations of the CIA are:

- Revise the stormwater bylaw to prevent discharge of contaminants from industrial premises, at source
- Trial and use emerging/innovative stormwater treatment methods (i.e. the mussel shell trials to remove dissolved metals from stormwater discharges currently underway by UC)
- Promote or require “at source” treatment of stormwater
- Include water sensitive design strategies within Engineering Code of Practice
- Keep spring flows separate from the stormwater system
- Collaboratively develop a “revegetation planting plan” to be referred to during stormwater treatment retrofits for existing urban areas when designing wetlands, wet basins, swales and when planting open drains.

Recommendations

That the Waimakariri Water Management Zone Committee:

1. **Receives** this briefing paper.
2. **Notes** the pending application for stormwater discharge consent for the Rangiora stormwater network to be lodged shortly with Environment Canterbury.
3. **Notes** the application processing by Environment Canterbury and agreements reached therein will provide a template for the stormwater consent application processes for the other major towns in the District.

Janet Fraser, on behalf of Waimakariri District Council

AGENDA ITEM NO: 5	**SUBJECT:** Silverstream Hatchery Update – ideas for improving water quality and flows in the Silverstream
REPORT TO: Waimakariri Water Zone Committee	**MEETING DATE:** 13 November 2017
REPORT BY: Matt Dodson, ECan Hydrogeologist & Karl French, Manager Silverstream Hatchery	

On Wednesday 28 June Karl French (Manager of Silverstream Hatchery), Larry Burke (of the NZ Salmon Angler's Association) and Matt Dodson (Hydrogeologist at ECan) met to discuss ideas for improving water quality and flows in the Silverstream. This paper provides an overview of what these gentlemen covered for an ongoing dialogue with the Waimakariri Water Zone Committee on water quality and flows in the Silverstream.

Considerations covered:

- Ways of improving water quality and flows in Silverstream
- Gaining a clearer understanding of the consenting process and potential issues required for a new groundwater take in the Eyre River Groundwater Allocation Zone (105% allocated). This groundwater take is intended to be used solely for augmenting river flows and improving river water quality
- Minimum flows for the Silverstream/Kaiapoi River
- Maintenance of the spring head to improve river flows and reduce sediment input
- What hatchery impacts are Environment Canterbury interested in
- Engagement with Mana Whenua around water issues in the Silverstream
- Blue skies ideas

Summary notes from the meeting:

Karl and Larry are keen to inform the Waimakariri Water Zone Committee of the issues the hatchery are currently facing and some of their solutions.

Issue 1: Nitrogen and flows and there effect on smelts in early life stages

- Potential solution: For the hatchery to take water from a new deeper bore. This deeper bore will continue to be used to augment river flows and reducing instream nitrogen concentrations.
- Karl wanted to know what the typical water chemistry of deeper bores is within the district (Matt has provided water chemistry data to Karl from deeper bores in vicinity of the hatchery).
- Karl also asked about some of the consenting hurdles for this potential solution.

Notes:

The hatchery has for approximately 15 years, been augmenting the flows in the Silverstream at times during the year. The driver to drill a new deeper bore is that the concentration of nitrogen

in the shallow aquifer, are at similar concentration to the river, and we expect them to increase with time. Before Karl proceeds with his potential solution, he wants to know if the nitrogen concentrations in the deeper aquifers are less than the shallow aquifers (hence why he asked for the chemistry data), and if the nitrogen concentrations are likely to change in the future. The technical team will provide this information to Karl.

There are some hurdles for this potential solution. The hatchery has a current consent to abstract water from two 10 and 12 meter deep bores, at a maximum combined rate of 76 L/s. The hatchery's groundwater take is non-consumptive and deemed 100% stream depleting. The take is non-consumptive because it abstracts water that would have flowed into Silverstream but discharges all the abstracted water back into the river at nearly the same spot (i.e. it has a negligible overall effect to the river). As the take is non-consumptive, it does not have a minimum flow; it is not required to have a water meter; and it is not included in the allocation blocks of either the Kaiapoi River surface water or Eyre River groundwater allocation zones.

The proposal to take groundwater from deeper bores would be considered as a new groundwater take and it is unlikely to be considered non-consumptive as it is unlikely to be 100% stream depleting. The hatchery is within the Eyre River groundwater allocation zone, which is over-allocated, meaning that a new groundwater take application will not be accepted as it is a prohibited activity.

There are rules in the LWRP about transferring groundwater allocation from one person to another. The first step is finding someone with a groundwater take that is willing to transfer allocation to the hatchery. A consent would then need to be sought for this groundwater transfer. The hatchery in its assessment of environmental effects, that would accompany the transfer application, would need to assess its effects on neighbouring wells and stream depletion; and the take would unlikely to be considered non-consumptive.

Additional to these barriers, there is a risk that a deep bore will not yield the amount of water the hatchery is after.

How can the ZC help? The WWZC will discuss the Eyre River groundwater allocation zone regime, Kaiapoi River surface water allocation regime and stream depletion rules in the new year.

The committee could consider asking for rule provisions to enable activities such as being proposed by the hatchery.

Issue 2: Flows and its effects on smelts in early life stages

- Karl's proposed solution: Consider raising the minimum flow for Silverstream/Kaiapoi. This should provide additional protection for current activities reliant on a flowing river. This includes not only hatchery but protects fish spawning beds and Kai gathering activities for Mana Whenua and the wider community.

Notes:

The current minimum flow for the Kaiapoi River, including Silverstream, is 600 L/s. The minimum flow site is at Neeves Road. The A Block is 1,000 L/s, of which approximately 340 L/s is currently

allocated (i.e. 34% allocated). The COMAR and ecological reports (Golder, 2009[1]) both recommend raising the minimum flow for the Kaiapoi River. Additionally, it is likely that changing the stream depletion rules from the WRRP rules to the LWRP rules would have a positive impact of river flows (Dodson and Smith, 2017[2]).

How can the ZC help? The WWZC will discuss stream depletion rules and Kaiapoi River surface water allocation regimes in the New Year.

Issue 3: River Temperature and its effects on smelts in early life stages

- Karl and Larry's proposed solution: Narrow wide parts of the Silverstream to increase water velocity and reduce peak temperatures. The introduction of plant cover would also be required to have a meaningful effect.

How can the ZC help? The WWZC will discuss Instream Ecosystems in November 2017, which will cover topics such as riparian planting.

Issue 3: Spring Heads

- Identification and protection of local spring heads that flow into the Silverstream. This would include fencing and riparian planting. After planting short term active maintenance would be required.

Notes:

As a part of the first 500 project, a spring heads upstream from the hatchery has recently been identified and will be fenced.

How can the ZC help? The WWZC will discuss Instream Ecosystems in November 2017, which will cover topics such as riparian planting, spring head protection and fencing.

Issue 4: Hatcheries impact on water quality

- The hatchery has an impact on water quality, for instance producing nitrogen via fed and waste from the smolts.
- Karl is currently exploring techniques/methods of mitigating the impact of his business on the waterway.

1 https://apps.canterburymaps.govt.nz/WaimakStoryMap/images/Golder%20Assc%20(2009)%20Min%20flow%20Waimak%20tribs.pdf

2 https://apps.canterburymaps.govt.nz/WaimakStoryMap/images/Stream-depletion%20Assessment%20Memo%20Matt%20Dodson%20Feb%202017.pdf

Communication: Mana Whenua

- Karl asked how best to communicate concerns and share solution ideas with Mana whenua. Matt provided Karl with contact details for Te Ngāi Tūāhuriri Rūnanga

Notes:

Matt to follow up with Stephen, Murray and Nigel Harris about a possible meeting with Rūnanga representatives.

Blue Sky Idea: Reconnecting the Waimakariri to the Silverstream (aka North Branch of the Waimakariri in the 1930's):

- Reconnecting the Waimakariri to the Silverstream. Controlled reconnection required re flooding. This would boost the Silverstream flow and dilute spring nutrients.

Notes:

Environment Canterbury River Engineers have been consulted about this blue sky idea. Their opinion was that any structures to encourage flow from the river to Silverstream (i.e. a siphon) would be very expensive – more expensive for example, than linking the stockwater/irrigation races to the top of Silverstream and getting water in that way.

And obviously they wouldn't want to reduce the flood protection provided by the stop banks.