ASHBURTON DISTRICT STOCKWATER RACES: A WIN-WIN OPPORTUNITY

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ABSTRACT

Against a background of a changing regulatory environment and the need to address increasing demand on limited resources, the stockwater races and the water that supports the races of the Ashburton District are currently being examined. These 100 plus year old races have been identified as a key opportunity in the ability to deliver water efficiency improvements in mid Canterbury and to increase flows in the Ashburton River.

A high level, strategic study was undertaken in 2012 to determine whether any water could be made available within the stockwater network through water efficiency improvements and how that 'unrequired' water could be used elsewhere within the District to help achieve local and regional objectives. This paper examines some of the outputs of that study including an introduction to the regulatory environment, a stockwater balance of uses and losses, and the potential impacts of race closure. The paper also discusses the outcomes of a survey of customers on the stockwater network to identify the extent of the network required to service those customers who still require a stockwater service. The survey provides an indication on where potential savings could be made and opportunities for alternative sources of water.

KEYWORDS

Water Resources, Water Efficiency, Productive Water, Security of Supply, Water Race Closure

1 INTRODUCTION

Water is vital to the Ashburton District's economic, social and environmental wellbeing. Agriculture and associated support services and industry are a major contributor to the primary sector and economy of the Ashburton District, as well as the wider Canterbury region and at the national level in general. Access to, security of supply and the wise use of water resources is essential for continued sustainable development.

The Ashburton District Council (ADC) operates and maintains an extensive open stockwater race network of 2,400km, supplying approximately 233,000 hectares (ha) of land and approximately 1,800 properties within the District. The network is the largest stockwater network in Canterbury.

Improvements in water efficiency in mid Canterbury are identified in the Canterbury Water Management Strategy (2009) (CWMS) as a key project in combination with others, to aid in meeting community needs and deliver substantially more water for productive purposes.

At the local level, priority outcomes for the District are identified in the Ashburton Zone Implementation Programme (ZIP) (n.d.); a non-statutory implementation tool of the CWMS. Priority outcomes include the Hakatere/Ashburton River, ecosystem health and biodiversity, water quality and water quantity. ADC's network of stockwater races is identified both as an issue from a water quantity and quality perspective, and as an opportunity to share any potentially saved water. The Ashburton ZIP states the future of the stockwater schemes *'will depend on the necessity of the supply, affordability of alternative means of supply and the extent of the network's contributions to the CWMS goals and targets.'* (p.10).

This paper examines a recent strategic study (Opus, 2012) and customer survey (Opus, 2013) to determine the necessity for stockwater, potential improvements to the network including combining the provision of stockwater with irrigation schemes and potential impacts of race closure. As part of this work we considered the affordability of an alternative supply and potential contributions to local and regional objectives. Recommendations highlighted the need for further detailed work and an ecological assessment of the races.

2 CONTEXT

The stockwater races form an established part of the Canterbury Plains, both in a geographic/landscape sense and in an economic/land use sense. The Hearing Commissioner's Final Decision (2009) for the replacement stockwater resource consents concluded (para 4.9) *'the ADC stockwater Scheme is an 'embedded' part of the existing environment in terms of its relationship and effects upon the social and economic characteristics of the communities it serves as well as the nature of the water, soil and ecosystems that have developed in consequence of its operations'*.

The very first races were constructed in the early to mid 1860's. These were constructed to serve more intensive forms of farming as expansion into the meat and wheat markets occurred. As individual races began to appear, run-holders collaborated and began to connect and expand their races, forming race schemes. By 1915, the main sections of the stockwater race network across Canterbury were significantly finished.

The Ashburton District network extends from the Rakaia River in the north to the Rangitata River in the south. It consists of approximately 472 km of main races and 1,927 km of minor races with ADC responsible for maintaining the majority of the main races. There are 27 intakes, including one from the Rangitata Diversion Race (RDR) at Klondyke and the Acton intake which is operated and managed by Acton Irrigation Ltd. Ten of these 27 abstractions are from Hakatere/Ashburton River system. The total rate of water abstraction across the District is 8,281 L/s with 5,355 l/s sourced from the Hakatere/Ashburton River catchment.

The stockwater network is primarily a gravity fed open race system. The Council also provides stockwater via two piped schemes in Methven/Springfield and Montalto areas. These schemes are also used for household purposes and are treated to provide potable water.

Today the stockwater network faces increased pressure from other resource users but primarily faces regulatory pressure. ADC is actively pursuing race network rationalisation and improved hydraulic management within the network. Until recently ADC had a target of reducing the length of the stockwater races by 100km per year. Since 2004, the network has reduced from 3,600km of races to 2,400km; a reduction of 1,200km over eight years. A continued reduction in races is likely as more properties convert to dairy farming requiring higher quality water and the removal of races from paddocks for management requirements. However, it is becoming more difficult to close large sections of the network with many of the closures to date being considered as the easy wins.

3 REGULATORY ENVIRONMENT

There are currently three key documents concerning water management in Canterbury. The CWMS takes a collaborative and integrated approach providing long term direction for the management of Canterbury water and is a strategic response to increasing demand on limited resources. The Strategy has led to the need for local decision making to address local land and water management issues culminating in Zone Implementation Programmes or ZIPs. These local programmes identify environmental outcomes which can be achieved in part by the setting of sub-regional rules and policies in the recently notified proposed Land and Water Regional Plan (LWRP).

3.1 CANTERBURY WATER MANAGEMENT STRATEGY

The CWMS is a non-statutory leadership document published in November 2009. Under the Environment Canterbury (Temporary Commissioners and Improved Water Management) Act (2010), the Regional Council is required to have regard to the vision and principles of the CWMS with respect to its regional plans and policy statements. The CWMS sets the vision for Canterbury water and forges a paradigm shift in water management focused on integrated management with a holistic approach to land and water management. Responsibility to improve how water is used falls to both existing and new users.

The CWMS has created ten water management zones and established working committees for each zone comprising key stakeholders and community representatives. The purpose of these committees is to develop non-statutory implementation programmes, called a ZIP. These programmes serve as living documents to address local environmental concerns, including *inter alia* ecosystem protection and restoration, investment in new infrastructure, water allocation, land management practices and water use efficiency. The committees are tasked with identifying and recommending actions and approaches for integrated water management solutions to achieve the CWMS. Recommendations from the ZIP will form the basis of the sub-regional chapters of the proposed LWRP through plan changes.

3.2 ASHBURTON ZONE IMPLEMENTATION PROGRAMME

The Ashburton ZIP identifies outcomes, priorities and recommended actions for local water management and in particular, the management of flows in the Hakatere/Ashburton and Hinds River catchments and of water quality. The ZIP seeks to achieve four priority outcomes:

- Hakatere/Ashburton River – improved and protected natural character and mauri
- Ecosystem health and biodiversity – protected and improved
- Water quality – protected and improved
- Water quantity – efficiently used, and secure and reliable supply of water.

The ZIP identifies the investigation of issues and opportunities around stockwater races as a recommended action to meet the priority outcomes.

3.3 PROPOSED LAND AND WATER REGIONAL PLAN

The proposed LWRP (2012) provides a framework enabling implementation of the CWMS as decisions on the proposed LWRP must have particular regard to the vision and principles of the Strategy. The proposed LWRP provides an integrated approach to the management of land and water resources, providing greater direction on appropriate resource management outcomes.

The proposed LWRP provides a two tier approach to water management in Canterbury. It sets out region wide objectives, policies and rules. It then sets out sub-regional policies and rules providing catchment specific rules linked to the relevant ZIP as the foundation document.

The Ashburton sub-regional chapter introduces increased minimum flows for the Hakatere/Ashburton River and a water allocation regime to achieve the priority outcomes identified in the ZIP, with benefits for in-stream values, water efficiency and reliability of supply. The proposed LWRP seeks a reduction in abstraction that supplies the Ashburton stockwater races from the Hakatere/Ashburton River. It is anticipated that the changes in the flow regime occur over time so that the impact on existing activities is minimal.

In consideration of the need to carry out the various investigations, the concept and detail design, as well as the usual programming, budgeting, consultation and construction; and the acknowledgement of the vast area covered by the network, ADC is currently working towards a ten year timeframe to deliver savings envisaged by the proposed LWRP.

4 STOCKWATER BALANCE

While the open water race network is designed to supply stockwater throughout the District, there is little data relating to the actual demand or usage of this water by stock. In addition, stock numbers are constantly changing as landowners vary their landuse for a variety of reasons. The lack of known usage was confirmed in a recent survey of customers whereby half of those who relied on the stockwater network knew very little about the volume of water they were actually taking from the open races.

In 2011, Opus attempted to quantify a water balance for the Ashburton open race network. The key elements of that water balance are described below.

4.1 USES OF WATER

Livestock 4% - A typical allowance for stockwater is between 72 and 230 L/ha/day depending on stocking rates (dryland to dairy). An overall estimate of approximately the average of this range i.e. 120 L/ha/day, was used for the area serviced by the Ashburton stockwater race network.

Domestic Uses 5% - Water from the races is also used for domestic irrigation as well as other domestic uses, although the exact volume of water has never been quantified. ADC (2008) recognise that some water race customers are reliant on the races for domestic use. Five percent of the total take was allowed for this domestic usage.

4.2 LOSSES FROM THE NETWORK

Evaporation 1% - Across the 2,400km of races, estimated evaporation rates are an average of 69 L/s and a peak instantaneous flow loss of 210 L/s.

Transpiration 3% - Estimated at 278 L/s under normal climatic conditions.

Discharges 5% - Water is discharged from the network directly into drains, streams, rivers and to the sea. For most of the discharges the volume is relatively small (up to 10 L/s) but during wet weather these may increase significantly as the races receive surface runoff.

Infiltration 82% - Water is lost to groundwater by seepage from the races. Water is also discharged directly to the ground at the ends of small distributor races. It is thought that approximately 82% of the abstracted water is lost to infiltration but contributes to groundwater recharge. This figure is consistent with 80-90% losses reported by Environmental Consultancy Services Limited (2000a & b) where flow measurements were carried out in the Ashburton and Selwyn Districts.

4.3 SUMMARY

From a total consented abstraction rate (across the District) of 8,281 L/s, the majority of the water is lost to infiltration with only 4% estimated to be taken for stock drinking water and another 5% used for domestic purposes including irrigation. Assuming this water balance is reasonably representative of average conditions, it suggests that stock and domestic requirements across the District could be met with a total flow of 745 L/s or 9% of the water consented to be taken.

5 CUSTOMER SURVEY RESULTS

In April this year, a survey of the stockwater network users was sent to over 2,000 customers, owned by approximately 1,800 landowners. The survey was designed to:

- Identify uses of the stockwater network
- Identify existing and future alternative sources of water available to individuals
- Determine the extent of the network required to service stockwater customers.

The survey yielded a response rate of 75%. This is considered to be a very high response rate providing a high level of confidence that the results are representative of the survey group and the ability to progress more detailed investigations.

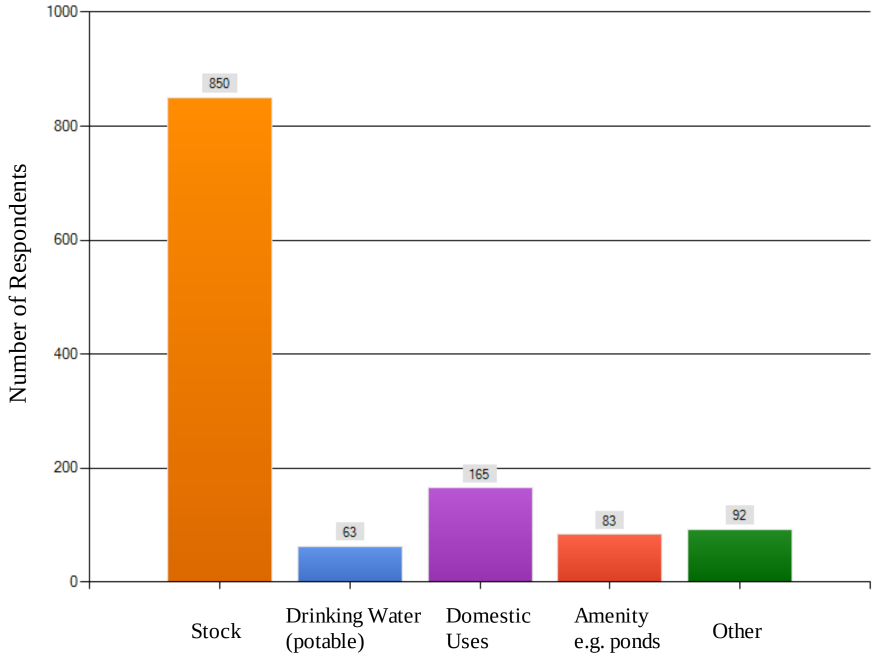
5.1 STOCKWATER NETWORK USAGE

Of the 1,530 responses returned, 58% (888) of respondents stated that the supply of stockwater was essential for their farming operation with stockwater races located on or adjacent to 85% (1,308) of all properties. The results indicate that although some customers do not rely on the stockwater network or do not consider it essential for their farming operation, they still use the water that passes by or through their properties.

The survey sought to identify the various uses made of the stockwater supply. Approximately 70% (1,066) of all customers use the water races for stock drinking water, 11% (173) use the water for domestic uses and 4% (65) use the service to supply potable water. Stockwater is also used to provide water for amenity ponds for 8% (118) of the responses.

Where the supply of stockwater was identified as essential for the farming operation (888 respondents), the uses of that supply are shown in Figure 1. The predominant use of the water supply for those who rely on the network is stock drinking water at 96% (850). However, half (52%, 443) of the core users did not know how much stockwater they required during peak periods. Approximately 19% (165) of users also rely on the stockwater network for domestic purposes and although not intended for human consumption, 7% (63) use the stockwater for drinking water.

Figure 1: Uses of the Stockwater Network for Core Users



Other uses identified by respondents include (and in no particular order):

- No use
- Irrigation, including crops, trees, plants and gardens
- As a conduit for flood/stormwater in times of high rainfall
- Providing biodiversity e.g., bees, frogs, fish
- Fire fighting
- Emergency water supply when wells go dry or when power is lost, for example, during heavy snowfall events
- Cow shed water
- Vehicle washdown
- Passive enjoyment.

Of the 888 respondents who identified that the supply of stockwater was essential for their farming operation, 854 specifically stated that they use the water for stock drinking water, potable water or for other domestic uses including, for example, toilet flushing and household cleaning. As these three uses are considered by the ADC to be the core uses of the scheme, the majority of the following results relate to these 854 respondents.

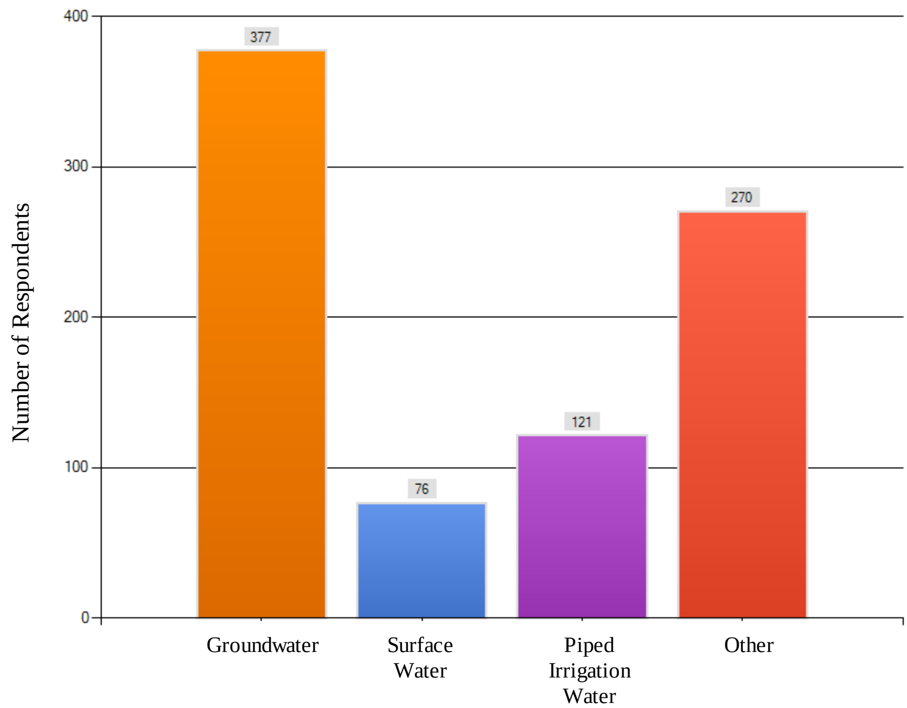
5.2 ALTERNATIVE SOURCES OF WATER

For those whom the supply of water is essential and who use it for stock drinking water, potable supply and domestic uses, 78% (668) of respondents considered that the stockwater network provides a reliable supply of water.

Respondents were asked to identify access to sources of water on their property. At least 67% (574) of respondents indicated that they had access to sources other than the stockwater network with sources of water shown in Figure 2. Of those that had alternative access, at least 377 (66%) had access to groundwater on their property. It is noted that these numbers to do not include those who ticked ‘other’ but specified for example, bore water. Respondents selected all alternatives that were available for their properties. It is notable that 140

(16%) of the 854 respondents did not answer this question. It seems likely that these users did not have access to alternative sources of water.

Figure 2: Alternative Access to Water for Core Users



'Other' access to water as stated by respondents include:

- No alternative
- Rainwater off the house roof
- Irrigation and domestic schemes, and town supply.

Approximately half of the core users stated that they have had to obtain stockwater from an alternative source when water has not been available from the network and 45% (382) of core users stated that they could not obtain stockwater from any other source on their property.

For those that could obtain stockwater from an alternative source (60%, 516), half said the other source would be sufficient to reliably meet their current and future stockwater needs. The following alternative sources for stockwater supply were identified:

Table 1: Alternative Sources of Stockwater

Alternative Source	Number of Respondents
Groundwater	289
Surface water	22
Irrigation scheme	127
Other	78

The survey asked respondents to consider irrigation schemes as a potential alternative water source. An irrigation race or piped network is located within one kilometre of 42% (357) of core users. Only 16% (137) were currently a member or shareholder of a piped irrigation scheme and 12% (105) were currently serviced by an open race scheme that would likely be piped within the next five to ten years. Of these, the majority (82%, 86) were likely to join the scheme. However, 42% (360) have no piped infrastructure and 53% (450) have no irrigation system on the property.

5.3 LOCATION OF STOCKWATER NEED

Support for closure of the open race network can be considered in terms of both the total respondents and those that rely on the supply for core uses (refer Table 2). While 42% (642) across all respondents support race closure, only 18% (157) of those who rely on the water for stock drinking water and domestic uses support their closure.

Table 2: Support for Race Closure

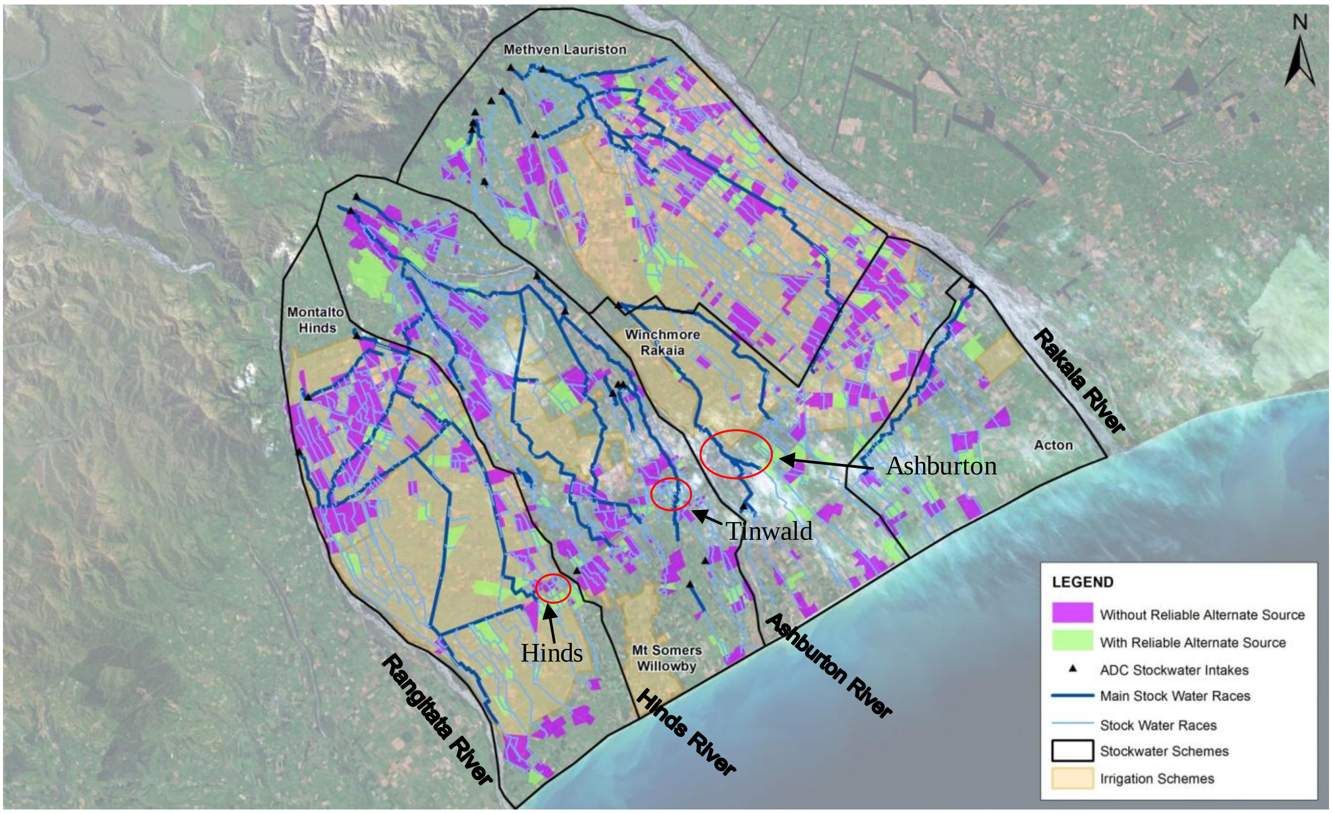
Support Closure	All Respondents		Core Users*	
	No.	%	No.	%
Yes	642	42	157	18
No	745	49	671	79
No answer	143	9	26	3
Total Responses	1530	100	854	100

*Core users who have identified the supply of stockwater is essential for their farming operation.

The results of those who rely on the network have been mapped to identify where the stockwater is presently essential. Figure 3 shows the location of core users who identified that the supply of stockwater was essential to their farming operation and do not support closure of the races. The map identifies the need for core uses with respect to the existing open race stockwater network. It also identifies those users who stated that the supply of stockwater was essential but have a reliable alternative source.

Figure 3 shows that the need for stockwater is spread across the scheme area. However, there are some clusters of users, particularly around abstraction points in the foothills and around the State Highway One between Tinwald and Hinds townships. It is clear that for some races, the only users who rely on the network without a reliable alternative supply of water are those at the most distal parts of the network from the intakes.

Figure 3: Location of Stockwater Need



5.4 FUTURE SOURCES OF WATER

Survey respondents were asked to consider their future farming operation. Responses are similar when comparing core users to those of all the respondents. Approximately 20% of both groups are considering sourcing either alternative or additional water within the next five years from predominantly groundwater or an irrigation scheme. Five percent also intend to change their farming activity in the next five years.

6 OPPORTUNITIES FOR ALTERNATIVE SOURCES

The spread of stockwater need across the District makes the consideration of alternative supplies more challenging. However, some clusters are apparent and there is certainly opportunity here for significant water savings. While decisions cannot be made without further investigation and discussions at individual farm level, consideration can be given to likely alternatives to supply stockwater to support a number of potential stockwater schemes at a scale smaller than that currently serviced. Of course, opportunities to provide smaller stockwater schemes and any alternative mechanisms for delivery of water will need to be appropriately funded and this may provide a challenge to ADC.

6.1 IRRIGATION SCHEMES

Within the stockwater network area, there are several existing irrigation schemes:

- Acton Farmers Irrigation Co-operative – utilises stockwater races to deliver irrigation water.
- Barrhill Chertsey Irrigation Scheme – a piped network still under development.
- Ashburton Lyndhurst Irrigation Limited – a partly piped network currently upgrading the remainder of the network from races to a piped scheme.
- Greenstreet – open channel races.
- Eiffelton Community Irrigation Scheme – open channel races.
- Mayfield Hinds Irrigation Limited – open channel races but considering an upgrade to a piped network.
- Valetta Irrigation Limited – an existing open channel network currently being piped.

Some of the existing irrigation schemes are proposed to be piped in the near future. Given the expansive areas that these schemes cover, this presents a real opportunity for dialogue with the irrigation schemes to explore the feasibility of either combining services or sharing trenches and other facilities.

Stockwater could potentially be provided jointly with irrigation water or as a separate reticulated supply alongside a piped irrigation network. Either option may only add a relatively minor cost to the cost of an irrigation scheme. However, it is noted that it may not be feasible to combine a continual supply of small quantities of stockwater with significant volumes of irrigation water delivered only over the irrigation season and there may be problems from silt in the small pipes and fittings required for stockwater supply.

As many of the irrigation schemes throughout the Ashburton District are currently considering moving from open races to a piped network, it would be timely to pursue these opportunities.

6.2 GROUNDWATER

Groundwater is a feasible option in areas where it is available and economically viable. Although the majority of the stockwater network area, with the exception of the Mayfield-Hinds area, is restricted (red zone) for groundwater abstraction, the proposed LWRP supports the abstraction of groundwater where the equivalent of surface water abstraction is surrendered.

Seaward of State Highway One, reliable groundwater can be typically obtained at depths of 20-50m. Sourcing groundwater in these areas could be an affordable option to deliver stockwater, but may be less so in areas landward of State Highway One which usually require bore depths of 60-120m to obtain a good supply of water. There also tends to be less certainty of obtaining reliable yields towards the foothills.

Consideration should be given to ensuring the supply of water is of suitable quality for stock drinking. Supplies with high mineral concentrations (e.g. iron, manganese) may be less palatable to stock and cause other issues with infrastructure (e.g. scaling). Some areas also have an increasing trend of nitrate levels in the groundwater.

6.3 SURFACE WATER

A consideration of specific alternative surface water options is challenging to determine at this stage, without first considering the ability to deliver water through irrigation networks or obtaining water from groundwater. Surface water may be the only alternative in areas where access to groundwater is unreliable. Surface water from around the foothills will likely provide a good source of good quality water.

Significant savings can be achieved if a piped scheme delivered water to a cluster of users rather than an open race network to intermittent users along the length of the scheme. As the Hakatere/Ashburton River is an over-allocated catchment, priority should be given to obtaining water from alternative sources for existing abstractions from the River or at the very least, reducing current abstractions through the delivery of water through a piped network.

7 POTENTIAL IMPACTS OF RACE CLOSURE

A number of previous studies have investigated options for improving the efficiency of the stockwater race network (Beca Steven, 1994; Opus, 2008; Opus, 2011). These studies have generally concluded that only small gains in efficiency are possible without converting the open races to a piped network. Any gains resulting from increased efficiency are likely to be very small and within the margins of error inherent in current data and information relating to the stockwater race network.

Any reconsideration of the supply of stockwater which involves race closure should consider the likely impacts of doing so. The likely impacts from converting stockwater races to a piped network can be defined as:

- Reduction of aquifer recharge from loss of seepage with potential effects on shallow bores and surface water
- Loss of habitat within the races for fauna and flora
- Loss of visual amenity.

7.1 LOSS OF WATER AS SEEPAGE TO THE AQUIFER

The stockwater races as an open-channel scheme are technically inefficient primarily due to the losses from seepage along races. It is also affected by the need for races to follow ground contours which may not necessarily result in the most direct route from the intake to any given user. While the closure and/or piping of races will minimise water losses resulting from inaccurate delivery and leakage, the groundwater recharge contribution from leakage will be significantly reduced.

Groundwater is primarily recharged from river leakage and secondly from land surface drainage due to rainfall and irrigation. The stockwater races potentially contribute up to 19% of the recharge meaning race seepage helps to support groundwater levels. In contrast to other sources of land based recharge, for example, irrigation, seepage from stockwater races occurs throughout the year and over the entire Ashburton District and is therefore, more consistent. It has also been occurring for more than a century and so is an established component of the groundwater system.

These seepage losses make a positive contribution to the recharge of the groundwater resources of the Ashburton District and removing this seepage as a source of groundwater recharge would mean that wells in the area could be adversely affected (Brough, 2008). It is difficult to quantify with any certainty the exact impacts removing this recharge would have on individual bores, but there will likely be some impact. Previous studies suggest seepage could result in raising groundwater levels by one metre, particularly in the vicinity of soakpit discharges with localised benefits to bore owners (Waugh, 2008). There is also anecdotal evidence (Andrew Guthrie, pers comm.) of shallow household bores being influenced by the discharge of tail end race water into soakholes. Impacts are likely to relate to the lowering of groundwater levels on existing users with reduced reliability of supply, or users being unable to obtain their permitted or consented abstractions, and the need, and consequently, the cost to access deeper groundwater through:

- Lowering the abstraction pump
- Changing from a surface to a submersible pump
- Using more electricity to abstract water; or
- Drilling a deeper bore.

There is also likely to be some impact from the removal of stockwater races on spring fed flows which tend to occur in areas of shallow groundwater or a highwater table and in areas where the Hakatere/Ashburton River is losing water. However, this would be also difficult to quantify.

It is noted that there will be some compensation for this loss of recharge with the Regional Council's direction to increase irrigated land across Canterbury including the Ashburton District, in accordance with the regional concept plan of the CWMS. However, it may be some time before this is realised.

7.2 ECOSYSTEMS

Ashburton's water races are known to provide diverse aquatic and terrestrial habitats not commonly associated with the District's larger river systems. Both native and introduced species of biota are found including the common bully, upland bully, eel, brown trout, salmon, freshwater mussels and crayfish. Various birds and insects have been observed using the races and their margins as a source of food and shelter.

Significantly, the native Canterbury mudfish is only found on the Canterbury Plains and is a nationally endangered species. It is considered to be the second rarest, and therefore, threatened, native fish in New Zealand and is regarded as taonga species for iwi (Department of Conservation, n.d.). Mudfish have been recorded in the races in pockets between the Hakatere/Ashburton River and the Hinds River and in particular, in races fed by the Hinds River or which are linked to groundwater springs (O'Brien, n.d.).

Any race closure will need to take account of the ecological values that may be present in any particular race and to consider opportunities for enhancement or for translocation or habitat restoration in other areas to offset the potential loss.

7.3 VISUAL AMENITY

The races contribute to the aesthetic values of the region bringing social enjoyment and wellbeing to communities. They are considered by many to provide green corridors of plant life and aquatic habitat in an otherwise dry region.

Undertaking an ecological assessment will identify those races which have high ecological value and those areas which could be enhanced for their biodiversity value. Retention or enhancement of these races will enable their contribution to visual amenity also be retained.

8 CONCLUSIONS

With over 2,400km of races, Ashburton District has the largest stockwater network in Canterbury. A changing regulatory environment is placing increased pressure on water resources and Ashburton's stockwater races are viewed as an opportunity to reduce abstractions and return water to the over-allocated Hakatere/Ashburton River. A stockwater balance of the open races shows that more than 80% of the water taken is lost to infiltration with just 9% used for core uses including stockwater and domestic uses.

A survey in April this year yielded a high response rate giving confidence that the results are representative of the entire survey group. The supply of stockwater was considered essential for 58% of all respondents. Where these respondents used the water for core uses (854 respondents), 78% stated that the supply of stockwater was reliable and 53% had access to a reliable alternative source of water, predominantly from groundwater, but also access to water supplied by irrigation schemes.

Mapping the need for stockwater helps to identify future opportunities to rationalise the existing open race network. This could be achieved by a number of mechanisms, but predominantly by piped networks in combination with irrigation schemes or supplied from groundwater. This is particularly pertinent given that an irrigation race or piped irrigation network is located within 1km of 42% of core users who currently have no alternative access to a reliable supply of water. At the very least, smaller scheme areas will result in reduced surface water abstraction.

Any consideration of race closure must also take into account the potential impact on shallow bore users from the loss of seepage and subsequent recharge to groundwater, and the potential impacts on the loss of biodiversity and amenity values. It is inevitable that some races will be retained in their present form for biodiversity reasons, including for example, the endangered Canterbury mudfish.

Further detailed investigations are required at individual farm level to confirm the requirements for stockwater and options for providing alternative supplies. More detailed investigations are currently progressing to undertake an ecological assessment, consider concept options to supply water through irrigation schemes, identify and evaluate alternative options for sourcing and conveying water for core users, and to identify the cost implications of these options. Given the vast area of the network and the need to design, budget and construct any alternative means of delivery, ADC are working towards a ten year timeframe to deliver water savings envisaged by the proposed LWRP.

While the Ashburton stockwater races are identified as a water resource issue for the local area, the open races can also be viewed as a win-win opportunity to meet regulatory proposals to increase flows in the Hakatere/Ashburton River, an opportunity to enhance habitat for biodiversity values, while also providing a secure and reliable stockwater service for the rural community.

ACKNOWLEDGEMENTS

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