

CAREX News

The CAREX project is funded by the Mackenzie Charitable Foundation



Newsletter of the Freshwater Ecology Research Group

August 2018

Kia ora! Welcome to our August newsletter - here are some mid-winter updates from the CAREX team.

Research updates

Over the past few months, we've been busy with lab work and data analysis for tool trials and new field work in the Ararira-LII catchment. We have also been sharing what we've learned at public talks, outreach events and through new toolbox handouts that are now available. Actively communicating our research findings has been an important part of CAREX from the start and will continue as we move forward. Our funding from the Mackenzie Charitable Foundation ended earlier this year. We are grateful to the Foundation for their encouragement and support for our research programme over the past 10 years. We are hoping to secure new funding to continue this work and scale up the lessons learned in CAREX to waterways across catchments, regions and the country.

What affects aquatic plant growth?

Nuisance weedy aquatic plants that fill waterways and impede drainage are typical of many agricultural waterways in Canterbury. Last summer, we surveyed aquatic plants in 28 sites across the region to identify factors that affect their distribution and growth. Plant cover was measured along with several features of each waterway, such as sediment depth, bank slope, and water velocity. We found that aquatic plant cover increased with increasing sediment cover and sediment depth. On the other hand, plant cover decreased in waterways with faster moving water and more shade. With this information, we can target weedy plants with practical control tools that provide an alternative to mechanical clearance. Riparian planting is a good example; as riparian plants, such as native *Carex* sedges, grow they provide shade and can reduce excessive aquatic weed growth in the waterway.

For more details on the practical tools we have evaluated to control weedy aquatic plants, check out our latest paper, headed by PhD student Katie Collins, that was published in the New Zealand Journal of Marine & Freshwater Research. You can find the abstract here:

bit.ly/2ztzmpkh. For a copy, email carex@canterbury.ac.nz.



Percent cover of aquatic plants was measured using quadrats at 10-20 locations in each waterway.

Understanding nitrate loads

Nitrate loads tell us how much nitrate is being exported downstream from a particular source over time in a waterway. Annual nitrate loads, measured monthly in all CAREX waterways from 2013 - 2017, ranged from less than 1 to more than 70 tonnes nitrate ($\text{NO}_3\text{-N}$) per year. In work by PhD student, Brandon Goeller, we found that nitrate loads tend to be highest in wet seasons (autumn and winter) and years when increased flows from the spring/source flush nitrate stored in the soil. The size and flow of a waterway also influences loads and groundwater inputs of nitrate can be very large. The range of nitrate loads across the CAREX waterways gives us a benchmark for lowland Canterbury and can be used as a starting point for management. This information can also help us understand how well tools to reduce nitrate in waterways are working. For example, bioreactors need to be built large enough to handle the nitrate load coming from a particular source, such as tile drains.



Brandon Goeller sampling a bioreactor.

Working together with Living Water

Living Water is a partnership between the Department of Conservation and Fonterra working to find on-farm solutions to help improve freshwater ecosystems. Since 2014, Living Water has supported CAREX to add to the great work done by the Simpson family, who created a 1-ha wetland at the top of the waterway on their farm. Together, we have rebattered 850m of the waterway, added riparian plantings, conducted aquatic weed control trials, installed sediment traps and monitored of a full range of ecological health indicators. We are continuing to work with Living Water to

trial rehabilitation tools in waterways and on farms in the Ararira-LII catchment in Canterbury. We share expertise and are working together to find ways to apply the knowledge we have gained across catchments and regions throughout New Zealand. For more on Living Water see: www.livingwater.net.nz



Sharing what we have learned

In CAREX, we have tested 14+ tools applied in different combinations and at different scales in lowland waterways in Canterbury. We have a new series of handouts, based on our research, to guide farmers, landowners and stakeholders interested in undertaking rehabilitation in agricultural waterways. The handouts are now available through our website (www.carex.org.nz) or email us for copies (carex@canterbury.ac.nz). This autumn, we spoke about the tools we have tested to a group of interested farmers and members of industry groups at a Mahinga Kai farm Shed talk organised by Environment Canterbury, to the Lower Orari Catchment Group, and at the Agri Innovation Mid-Canterbury Seminar. Below, we see Brandon Goeller out at Snake Creek with Fish & Game and Living Water engaging with students from Leeston School and teaching them about freshwater rehabilitation (Photo credit: Robin Smith, DOC).



Rebattering makes a difference

Bank rebattering involves earthworks to reduce the slope and stabilise banks along a waterway. This helps to stop bank collapse, reduce erosion and increase the flood capacity of the waterway. Rebattering can also enhance the ecological benefits provided by riparian planting, as appropriate plants such as native *Carex* sedges can be planted right on the edge of the waterway, instead of at the top of an oversteeped bank. As the plants grow, they provide shade that extends across the waterway and can reduce the growth of nuisance aquatic weeds. Taller-growing shrubs and trees planted on the upper bank (ideally the north) can also work in this way, but will take longer to grow to a stage where they provide shade over the waterway.



Rebattering was done prior to planting Carex sedges and native shrubs along this waterway in a project funded by Environment Canterbury's Immediate Steps programme. After 2-3 years of growth and routine maintenance, Carex planted on the edge of this waterway were controlling leafy, emergent aquatic weeds, including monkey musk.

Innovative way to fund restoration

CAREX's work along Silverstream at the Simpson's farm has inspired others to undertake restoration further downstream. The Water & Wildlife Habitat Trust and dairy farmers Nathan and Jamie Fridd are restoring the 'drain' on their property to a thriving waterway. The Fridd's have owned the farm for three years and want to improve water quality and habitat to help support fish. The Trust and Fridd family are working with Million Metres Stream Project to help raise funds for the project. Million Metres aims to restore one million metres of waterways in New Zealand. To do this, they help landowners and community organisations with crowdfunding to raise funds.



This section of Silverstream is typical of many agricultural waterways in lowland Canterbury with: little to no plants in the riparian zone; steep banks; lots of aquatic weeds; and minimal habitat for fish.

Guided by work done upstream and some advice from CAREX, the plan is to rebatter and reshape the banks, which will reduce sediment input into the waterway and provide suitable ground for riparian plantings. Boulders, wood and gravel will be put back in the waterway to recreate pools and riffle habitats for fish and invertebrates. As the ~2000 native plants and trees to be planted along the waterway grow, they will provide shade that will cool the water and stop problematic aquatic weeds. To learn more about this project and how you can support it, watch the video here: bit.ly/2hONQv.

Landowners or community groups interested in crowdfunding to raise funds for their project can contact Million Meters' Project Coordinator, Alaina Pomeroy (alaina@sustainable.org.nz).

CAREX team news

Congrats to Katie Collins for publishing the first paper from her PhD (see page 1 of newsletter for the link to the paper) and to Brandon Goeller, who submitted his PhD in June. Well done, you two!

Are you interested in having a member of the CAREX team talk to your organisation, group or class about our research? Please contact us at carex@canterbury.ac.nz for more information.

Please note: The information provided in this newsletter is based on preliminary findings and is subject to revision and peer review. We share our results and findings to meet the need for best available science. Newsletters and information within cannot be reproduced without our express permission.

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