



LIVING

WATER

Dairy and freshwater thriving together

Evaluation Report

**Lakes Areare, Ruatuna, Rotomānuka/
Ngā roto o Areare, o Ruatuna, o Rotomānuka, Waikato**
July 2024

**Viv Sherwood
Will Allen
Waikato Peat Lakes Evaluation Team**

Part of the Living Water site evaluation series

Acknowledgements: This report was developed through a collaboration between the external evaluation consultants and the Living Water Waikato Peat Lakes Evaluation Team, consisting of Sarah Yarrow (Living Water National Manager), Katie Collins (Living Water Science Lead), Dion Patterson, Rose Graham (DOC Site Leads), and Tracie Dean-Speirs (Senior Partnerships Manager, Fonterra). We are grateful to all the individuals who generously contributed to this evaluation through their participation in workshops, group sessions, or individual interviews with the external consultants.

Note: Will Allen and Viv Sherwood have been involved in the monitoring and evaluation activities of the programme through the initial monitoring and evaluation design phases, and more recently in the development and implementation of this final evaluation phase.

Disclaimer: This document has been prepared for the benefit of the Living Water team, their partner organisations, and others as a resource to use in future thinking about the implementation of collaborative place-based initiatives. The material contained within is provided solely for the purpose of being used within anyone's own participatory process. It should be subject to further consideration and refinement in accordance with their specific needs and circumstances. The individual perspectives we have presented may not always reflect the perspective of a partner organisation or other entity.

Document citation: Sherwood V., Allen W., Waikato Peat Lakes (2024). Evaluation Report: Waikato Peat Lakes Evaluation. Available online at <https://www.livingwater.net.nz/our-progress-to-matou-kokenga-whakamua/>

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Contact details: Viv Sherwood – vivsherwood.nz@gmail.com;
Will Allen – willallen.nz@gmail.com,

Cover images: Living Water

Design and layout: Kate Veale



Executive summary

Introduction

The Waikato Peat Lakes programme, part of the 10-year Living Water partnership between the Department of Conservation (DOC) and Fonterra, was initially focused on three specific lakes – Areare, Rotomānuka and Ruatuna. Classified as ‘acutely threatened’, the Waikato peat lakes are important historically, culturally and environmentally. The key focus was restoring unique peat ecosystems by addressing sediment and nutrient issues, trialling interventions in and around the lakes and wider catchments, working with mana whenua, agencies and communities.

This evaluation, intended for the primary audience of programme stakeholders and partner agencies, assesses the programme’s impacts and development through a participatory and complexity-aware methodology. The report is structured to ensure a thorough understanding of the programme and to promote constructive reflection. It highlights insights, challenges, and lessons gained over the years, with recommendations focusing on being flexible beyond ‘business as usual’; strengthening inter-agency collaborations’ linkages with mana whenua and local landowners; supporting the implementation of Farm Environment Plans; ensuring mana whenua are engaged early, are resourced and part of decision-making; practising patience; and building on the scope and value that monitoring can provide.

This evaluation employs a performance story approach, which involves the key partners in collaborative activities to assess the programme’s outcomes and impacts. The report’s layout is designed to facilitate comprehensive understanding and constructive reflection. Chapter 1 outlines the evaluation framework and sets out the Waikato Peat Lakes programme context and development over time. Chapters 2 and 3 build on the programme’s Theories of Change (ToC) and logic model structure to provide a holistic perspective on activities and outcomes. Chapter 4 focuses on three key areas of the collaboration to explore insights, challenges, and lessons learned, presenting them in a way that ideally supports further facilitated discussions. Finally, Chapter 5 provides a performance summary and offers strategic recommendations to guide future work in similar contexts.

Importantly, this evaluation (along with those of the other Living Water sites) is not intended to conclude with these reports but to serve as a background document for facilitated discussions, helping stakeholders move forward. The reports have been designed with this use in mind, using the findings and insights to foster continued progress and adaptation.

Visualising the programme

Chapters 2 and 3 provide framings that enable the evaluation team to look across the individual activities and view the operation of the wider programme. The programme's evolving Theory of Change (ToC) is essentially a guide illustrating the process and rationale behind its expected impact, linking activities and outputs to desired outcomes, and serving as a foundation for strategic planning and execution.

Chapter 2 explores the multi-layered governance of the programme, including strategic oversight, national programme management, and site-level delivery. It demonstrates how the programme has evolved through different phases, starting from initial engagement and quick wins to strategy consolidation and expanding its impact. The involvement of a diverse range of groups has been crucial, with their expertise, resources, and support from local and wider community entities. The peat lake systems are complex, and have a long history of degradation. The programme's commitment to better understanding the ecological systems and ways of intervening to improve system health through a collaborative approach is evident through activities in and around the lake margins and wider catchment approaches. The chapter highlights specific initiatives like the trialling of floating wetlands and sediment traps, as well as collaborations to develop a pā harakeke and Manga-o-tama catchment restoration project. Key partners, including Ngāti Apakura, landowners, local councils, and community groups, have played an essential role in these efforts. The chapter concludes with metrics that showcase the programme's achievements, emphasising the tangible impact of collective efforts towards environmental resilience.

Chapter 3 focuses on the outcomes and impact of the Waikato Peat Lakes programme. It examines the changes that have occurred during the Living Water initiative, recognising that environmental change takes a long time. It outlines the changes the programme has contributed to in two ways. Firstly, a results table provides a brief overview of progress based on the programme's 2018 logic model. Secondly, outcomes are grouped by themes that represent the drivers and enablers of change within the wider human and ecological systems. These themes include organisational changes, relational changes, ecological changes and valuing the environment, capability and capacity changes, financial investment and impact, and scaling up and out. This strategic categorisation not only allows for a structured analysis of the programme's impact, but also highlights the multifaceted aspects of environmental change and the importance of a holistic approach to catchment management.

Insights, challenges, and lessons

Chapter 4 examines three key aspects of the Waikato Peat Lakes programme to support a reflective view of its overall impact and processes. It focuses on identifying insights, challenges, and lessons - elements commonly found, but often overlooked in complex programmes. The co-benefits identified are additional positive outcomes resulting from single programme activities, often spanning different areas of impact. These co-benefits demonstrate how integrating activities across different areas of impact has expanded the programme's overall effectiveness.

This chapter does not aim to provide an exhaustive overview but rather to spotlight some important lessons drawn from experiences across the 10 years of the programme. These insights, challenges, and lessons can also provide guidance for future land and water management projects, and others working ‘at place’. The chapter focuses on three key areas:

- **Adaptive resourcing:** This highlights the importance of flexible funding for both social and ecological processes as well as responsiveness to unexpected results and opportunities, changing priorities and approaches.
- **Integrating mātauranga Māori:** Tailored approaches, strong relationships and cultural capability is needed. The programme evolved to build stronger relationships with mana whenua by working together on the ground, improving the ability to incorporate mātauranga Māori and knowledge exchange.
- **Stronger relationships to increase resilience and impact:** The programme emphasised the value of building strong relationship networks. These networks helped expand efforts and reach by sharing knowledge, expertise, funding and resources.



The Waikato is home to 31 peat lakes which are a unique ecosystem, home to rare and threatened native plants and animals.

Progress assessment and recommendations

Chapter 5 provides a comprehensive overview of the progress, key achievements, and forward-looking recommendations from the Waikato Peat Lakes programme. The programme aimed to help restore the peat lake systems through a collaborative approach involving farmers, mana whenua and the local community. Key activities included addressing nutrient and sediment issues by testing in-lake and lake margin tools and solutions, riparian fencing, planting, and weed control. Initially, the focus was on scientific understanding, lake margin restoration work and building relationships. Over time, the programme developed collaborative efforts such as predator trapping, planting and pest control initiatives. It expanded into a broader catchment-scale initiative led by landowners, securing funding for water quality risk mapping, fencing, planting, and real-time water quality monitoring.

The programme achieved important intermediate outcomes, including improved relationships, increased biodiversity, and organisational changes within Fonterra and the Department of Conservation. Efforts to improve water quality, such as retiring land from grazing and planting along waterways, resulted in over 200,000 plants and 178 predator traps added across the three peat lake catchments, and almost 50 hectares of habitat restored. These outcomes demonstrate both the programme's and communities' commitment to environmental enhancement and the recognition of the need to actively improve land management practices and reduce impacts.

The programme faced challenges in building relationships between large organisations with different missions, early engagement with mana whenua, and maintaining strong relationships with the Waikato Regional Council. Limited resources posed challenges, limiting the scope and reach of habitat restoration and development of key relationships. This highlights the need for better resource allocation and sustainable funding models. Recognising the time and skills needed to build and maintain relationships and incorporating these considerations into project plans and budgets are essential for success.

The programme's flexibility led to unexpected positive outcomes, including securing external funding for broader catchment initiatives and fostering community identity around the peat lakes. However, challenges like pest plant management at Lake Ruatuna highlighted the need for ongoing funding to sustain restoration efforts. Community engagement resulted in the Ōhaupō community adopting 'Home of the Peat Lakes' as part of their identity, and Ngāti Apakura developing a biodegradable floating wetland.

The guiding principles and assumptions of Living Water played a crucial role in shaping the programme. The principles of collaboration, integration of mātauranga Māori, and creating connections were key drivers of early work. The programme's 2018 Theory of Change assumptions reflected the complexity of achieving programme goals and was validated through the achievements and challenges of operational delivery.

Reflecting on the journey of the Waikato Peat Lakes programme emphasises the value of collaboration and adaptive management in environmental initiatives. The following recommendations are provided for organisations, mana whenua, and communities, focusing on often-overlooked intermediate results that are essential for advancing long-term goals:

- **Be flexible beyond “business as usual”:** Adopt a holistic and flexible approach to roles and leadership, working with diverse partners, and supporting experimentation.
- **Strengthen interagency collaboration linkages with mana whenua and local landowners:** Build on and maintain linkages and opportunities for knowledge sharing, that informs strategies and actions and builds buy-in.
- **Support the implementation of Farm Environment Plans:** Follow up with landowners and managers to provide support for FEP implementation, ensuring sustained motivation and momentum.
- **Ensure mana whenua are engaged early, are resourced, and included in decision-making:** Prioritise early engagement, build relationships, and understand their contexts, aspirations, and capacity. Share decision-making, address power inequity, adapt ways of working and provide resources.
- **Practice patience:** Recognise the time needed to build and maintain relationships, gain momentum, and consider wider contexts. Patience and understanding reduce the risk of losing buy-in and demonstrate respect and commitment to genuine collaboration.
- **Build upon the scope and value that monitoring can offer:** Enhance monitoring practices by linking them to a broader Theory of Change. Incorporate regular evaluation practices that encourage teams to think collectively and holistically, considering social, cultural, economic, and environmental contexts.

These recommendations, derived from the insights, challenges, and practical experiences of the Waikato Peat Lakes programme, aim to advance management practices that are inclusive, adaptive, and resilient. They serve as actionable guides for future planning, ensuring that the evaluation remains a dynamic resource for ongoing and future collaborative initiatives.

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Abbreviations

CAME - Complexity-Aware Monitoring and Evaluation

DOC - Department of Conservation

FEPs - Farm Environment Plans

MEA - Mana Enhancing Agreement

MOA - Memorandum of Agreement

MSWRT - Mangaotama Stream and Wetland Restoration Trust

PSR - Performance Story Report

SDA - Sustainable Dairying Advisor (Fonterra)

ToC - Theory of Change

WDC - Waipā District Council

WRA - Waikato River Authority

WRC - Waikato Regional Council

1. Evaluation and programme introduction

Living Water, a partnership between the Department of Conservation (DOC) and Fonterra, was a ten-year programme to find ways to improve freshwater ecosystem health while enabling farming to thrive. The partnership was formed in 2013, marking the first national collaboration of its kind in New Zealand - between a government conservation agency and a primary industry cooperative - and emerged at a time of growing national concern about the impact of dairy farming on water quality.

Fonterra pledged \$20 million over 10 years for programmes, operationally overseen by DOC, complemented by DOC's commitment of approximately \$500,000 annually in staff time. The partnership aimed to improve freshwater ecosystems and increase biodiversity in agricultural landscapes. Five catchments, all with intensive dairying and challenging freshwater issues, were selected to trial a variety of tools and approaches. These catchments were: Wairua River, Northland; Pūkoro-Miranda, Hauraki; Lakes Areare, Ruatuna and Rotomānuka, Waikato; Ararira-LII River, Canterbury; and Awarua-Waituna Lagoon, Southland. Moving beyond a focus on individual farm enterprises, this partnership has embraced a comprehensive catchment-scale approach, deepening our understanding of effective environmental change on a larger scale and showcasing the contributions agencies and sectors can make at this level.



Figure 1. The Living Water sites

This report synthesises key insights, challenges, and lessons developed from an evaluation of the Waikato Peat Lakes (Lakes Areare, Ruatuna, and Rotomānuka) programme work. It is part of a series of five evaluations conducted across the Living Water sites, each building upon the valuable lessons learned. This report aims to provide a comprehensive analysis of the Waikato Peat Lakes programme, assessing its effectiveness and impact within the broader context of the Living Water initiative. By synthesising key insights, challenges, and lessons, this report contributes to the collective understanding of catchment-scale environmental management and highlights how this programme fits into and supports the overall objectives of the Living Water initiative.

1.1 Evaluation process, design and report structure

The evaluation process for each site is designed and implemented using a participatory model. In addition to forming evaluation teams composed of Living Water Partnership (Fonterra and DOC) staff at each site, the evaluation consultants conducted interviews with various stakeholders, reviewed relevant literature, and facilitated workshops with the entire Living Water team. The joint authorship of each of the site evaluation reports includes both the consultant evaluators, Will Allen and Viv Sherwood, and the Living Water Evaluation Team: Sarah Yarrow (Living Water National Manager), Katie Collins (Living Water Science Lead), and the appropriate Living Water site staff for each catchment. This collaborative approach ensured that the evaluation was co-created with people involved in and impacted by the programme, incorporating diverse perspectives and fostering a sense of shared ownership. While each evaluation is site-specific, the authors' collective work across the entire Living Water programme informs and enhances our understanding, enabling us to draw broader lessons and insights that benefit all sites.

The performance story design is based on methods that facilitate joint evaluation activities, ensuring a range of perspectives are considered. This approach ensures that each evaluation not only assesses the outcomes and impacts of interventions but also fosters a collaborative environment where insights and learning are shared and integrated into ongoing and future projects. The performance story report (PSR) design is used to explore and detail the extent of the intervention's contribution to outcomes. The report notes intended accomplishments, reports achievements against expectations, and discusses lessons learned and what will be changed. The process steps for this site included clarifying the programme logic, developing guiding questions for the performance inquiry process, and evidencing outcomes.

In addition to this evaluation, the authors note that the Living Water programme has utilised its comprehensive website to report on the implementation and results of various trials and processes. This website has served as a key platform for ongoing monitoring and documentation of the programme's activities, complementing the formal evaluation processes. The programme has also produced a Living Water ebook highlighting eight key lessons learned, which further contributes to the overall evaluation landscape.

Recognising the dynamic and interconnected nature of environmental and community programmes, this evaluation also utilises complexity-aware monitoring and evaluation (CAME) approaches. These approaches include systems thinking to understand interconnections, adaptive management to adjust strategies based on new learning, participatory methods to engage stakeholders, developmental evaluation to support innovation, outcome harvesting to identify contributions to change, and contribution analysis to establish links between activities and outcomes. These approaches are well-suited for capturing the nuanced and evolving impacts of the Living Water programme, providing a holistic understanding of its outcomes and the broader context in which it operates. The evaluation approach aims to:

- Complete the monitoring and reporting of Living Water activities as part of transparent and sound management.
- Establish a credible case for the programme's contribution while providing a common language for discussing different activity streams and focusing on results – including from a wider programme perspective.
- Support the programme and its partners as they look to encourage, guide, and catalyse future activities that aid agency and sector staff looking to support similar place-based initiatives.
- Assess the sustainability and scalability of the programme's outcomes and practices.
- Document and analyse the lessons learned and insights gained throughout the programme's implementation.

Importantly, this evaluation process was never designed to conclude with these reports. The reports are intended as aids to facilitate discussions with each site's partners and local communities, using the findings and aspects of the evaluation as prompts for facilitated learning debriefs or social learning discussions as part of a utilisation phase. This approach is particularly highlighted in the way Chapters 2 and 3 build on the structure of a logic model but provide a whole programme perspective. Similarly, Chapter 4 is designed to take a few key programme areas and use them to explore insights, challenges, and lessons. This method allows for addressing challenges in a non-personal way, setting the stage for future facilitated discussions in a safe environment.

The findings, conclusions, and recommendations of this report are designed to offer insights and lessons that can inform and enhance future work by the site partners. This evaluation for the Waikato Peat Lakes programme serves as a foundational piece for extracting broader lessons, particularly focusing on how agencies can improve catchment-level initiatives. Through this structured approach of evaluation at all five sites, the Living Water programme aspires to extract lessons learned to help inform and guide other catchment projects to achieve greater environmental resilience and community well-being.

Report structure

To effectively support a utilisation phase and future discussions, the structure of this report is designed to systematically present the evaluation findings and insights. The following outlines the structure of this report:

Chapter 1: Outlines the evaluation framework and introduces the Waikato Peat Lakes catchment contexts, the development of the Living Water work programme over time, and its underlying Theory of Change (ToC), that frames the remainder of the report.

Chapter 2: Delves into the inputs of the programme: the partners, knowledge, and resources. It outlines activities and outputs produced and, together with the milestone timeline, provides a snapshot of the programme's collaborations over the past ten years.

Chapter 3: Focuses on outcomes - the actual difference the programme has made in the real world. This analysis is conducted across themes instead of their relation to individual activity areas, as some outcomes achieved often span multiple activity areas. Detail is provided on intermediate outcomes, changes in practices, and the impacts across diverse catchment groupings such as mana whenua, sector organisations, farmers, community groups, and schools.

Chapter 4: Presents key findings, co-benefits, insights, challenges, and lessons learned from the Waikato Peat Lakes programme. It highlights the collective experiences over the last decade, focusing on three specific areas to illustrate the breadth of learning. This chapter shows how the insights and lessons can inform future catchment management projects, emphasising the interconnected nature of the programme's efforts and their broader applicability.

Chapter 5: Offers a broader evaluation of the programme's impact by outlining progress towards the desired long-term outcomes. This assessment looks at the contribution of intermediate outcomes, the potential unintended impacts, and the effectiveness of the programme's strategies. The chapter concludes by providing recommendations for future work.

1.2 Programme context and development

Understanding the broader context is crucial in evaluating any programme. A programme does not operate in isolation; it both draws from and contributes to the larger societal and environmental framework. Understanding this interaction is essential in assessing a programme's effectiveness and relevance. This brief context section acknowledges the national and local conversations, initiatives, policies, and cultural histories that influence environmental management and agricultural practices in New Zealand.

1.2.1 National context

Over the past twenty years, New Zealand has witnessed a transformative shift in its agricultural practices and environmental management involving the gradual introduction of a raft of guidelines, policies and national regulations aimed at enhancing water quality and resource management. In addition to increased water usage efficiency and a growing focus on biodiversity, there has been a strong focus on encouraging sustainable farming practices. Increased community involvement and participation in policy development and research have supported these developments. More recently there has also been considerable evolution of community catchment group initiatives, as communities recognise the need to work at a catchment (vs property) scale and seek to work together locally to address water quality challenges ahead of regulation.

Living Water's collaborative approach to catchment management reflects this contemporary approach to environmental management. It has encouraged collaboration and integrated management at the catchment level and beyond, emphasising the interconnection of land and water resources. It looked to address issues like freshwater contamination and biodiversity loss. Within this context, the Living Water programme focused on identifying practical, scalable solutions, reinforcing a comprehensive catchment-scale approach that deepens our understanding of effective environmental change on a larger scale and showcased the contributions agencies and sectors can make at this level.

The programme recognised the significance of wetlands, rivers, and other water bodies to the communities, particularly mana whenua. Living Water aimed to include mana whenua in the journey to address widespread environmental issues, and to acknowledge their whakapapa, cultural values, and unique perspectives on understanding and measuring environmental health. The Living Water programme also played a role in facilitating stakeholders to think about sustainable practices and biodiversity restoration.

Alongside Living Water a range of other key initiatives have contributed to this evolving catchment management framework and the landowner and perceptions about the changes required. These initiatives operate across a spectrum of scales, from farm-specific projects to comprehensive national strategies and are supported by government, industry, councils and non-government organisations. They include the Clean Streams Accord, Sustainable Dairying: Water Accord, Fonterra's Sustainable Dairying Tiaki Programme (farm environment planning), riparian planting projects, Predator-Free New Zealand 2050, National Policy Statement for Freshwater Management (Te Mana o te Wai), regional water

management strategies, and various research and development initiatives. All these collective efforts underscore a commitment to a more sustainable and environmentally conscious agricultural sector.

1.2.2 Catchment context

Peat lakes are rare globally, and the Waikato region is home to 31 of them. They make up the largest collection of peat lake habitat in New Zealand, and were once part of the extensive Komakorau, Rukuhia and Moanatuatua peat bogs.

Over time, the lakes have undergone changes such as vegetation clearance and drainage to convert the area into fertile land for farming. Inlet and outlet drains were dug to manage water levels. Dairy farming is a significant industry in the region, accounting for over 60% of export earnings. These changes have affected the lakes making them smaller, shallower, and more susceptible to temperature fluctuations, muddy waters, and runoff from surrounding farmland. Invasive fish species have also further degraded the peat lake ecosystems. As a result, the Department of Conservation (DOC) now classifies peat lake ecosystems as 'acutely threatened'. Despite their high biodiversity and recreational values, many of the lakes in the Waikato region are only partially protected as public reserves, often excluding their surrounding catchment or associated wetlands.

The Waikato peat lakes are also culturally and historically significant. Many of the lakes were part of the land confiscated (whenua raupatu) by the Government in the 1860s following the British invasion of the Waikato and the resulting land wars. This dispossession and disconnection from the land has impacted cultural practices and knowledge transmission. The raupatu grievance was settled in 1995 with Waikato-Tainui signing a Deed of Settlement with the Crown for the injustices. The settlement included co-management of Crown-administered reserves, including Lakes Areare, Ruatuna and Rotomānuka. For the three lake catchments, DOC and other agencies (such as Waipā District Council) have since been working with mana whenua Ngāti Apakura (Ruatuna and Rotomānuka), Ngāti Mahuta and Ngāti Wairere (both Lake Areare) to develop relationships, management plans and operational programmes for the reserves.

Treaty settlement processes related to the Waikato River also led to the formation of the Waikato River Authority. Together, Waikato River Iwi developed a joint vision and strategy to restore and protect the health and wellbeing of the Waikato River and tributaries. In 2012 they launched the Waikato River Clean-up Trust to provide grant funding for projects in the region, with initial grants totalling around \$800,000 and subsequent annual grants of more than \$5 million. This increase in funding has significantly contributed to projects aimed at improving the region's waterways.

The three lakes: Areare, Rotomānuka and Ruatuna

Lake Areare: The northernmost lake is Lake Areare, covering 31 hectares. It is located near Taupiri, between Ngāruawāhia and the Waikato Expressway, 20 km north of Hamilton. The Expressway now runs alongside the lake itself and through its catchment area of 268 hectares. Lake Areare holds cultural and historical significance to Ngāti Mahuta and Ngāti Wairere. It is considered a spiritual marker point for iwi territory and was once a valuable resource for local hapū and whānau. Areare (and Rotomānuka) is a wāhi tapu due to battles that took place nearby.

Now a DOC wildlife management reserve, the goals for the site are to protect wildlife, wetland habitats, and the cultural features (scenic, historic, archaeological, biological and geological). It is the largest of eight peat lakes associated with the historic Kainui Peat Bog. These lakes rank at the top in DOC's ecosystem prioritisation system, and in the top third of Waikato Regional Council's ranking of lakes for biodiversity management. The catchment area is primarily used for pastoral farming, including a mix of dairy and beef farming, as well as a growing number of lifestyle blocks.

The lake originally had no natural outflows. However, drainage was implemented to facilitate pasture development resulting in the construction of artificial drains that connect the lake to the Waikeri Stream which then flows into the Waikato River. A weir is used to maintain water levels in summer, reducing the impact of drainage on summer lake levels and peat settlement (as seen in all three of these peat lake systems). Lake water quality is classified as poor ('supertrophic').

Lake Ruatuna: Twenty kilometres south of Hamilton, this 13 ha lake has a 190 ha contributing (sub) catchment and is part of the larger Manga-o-tama catchment which flows west from the rural community of Ōhaupō into the Waipā River, and eventually into the Waikato River. This lake, along with Rotomānuka, Rotopiko and others, holds cultural significance within the Ngāti Apakura area. It was historically surrounded by extensive productive gardens and was the site of key battles.

Originally part of a larger wetland system, Lake Ruatuna is now a shallow lake (<2m deep) and surrounded by farmland. It receives water from drains in the surrounding farmland and drains out into the Waipā River through an outlet with a weir that maintains water levels in the summer. The lake is fully fenced to prevent stock access and has a relatively wide riparian margin in certain areas. Pest fish are present, but koi carp have never been detected.

The DOC reserve adjoins a WDC recreation reserve which includes education facilities used for school and scout group camps. Due to the declining water quality in the lake (nutrient rich and eutrophic - hypertrophic) visits to these facilities became less frequent and the facilities themselves deteriorated.

Rotomānuka lakes: East of Lake Ruatuna, these 45ha lakes were once connected. The catchment includes two basins, the Rotomānuka lakes ('North', and 'South' also known as Gin Lake), and the other Rotopiko lakes (North, South and East) also known as the Serpentine lakes.

The Rotomānuka catchment spans 479 ha and, like the other lake catchments, lacks natural inlet streams but is fed by groundwater runoff from surrounding pasture. A weir is used to maintain summer lake levels. The deepest and oldest lakes in the Waipā District, connected by marginal wetland. Water quality varies due to differences in lake depth: the North lake is eutrophic and has better water quality compared to the hypertrophic South Lake.

The lakes are almost completely fenced to keep out livestock. However, the margin reserves, although narrow in some places, have expanded due to peat shrinkage, leading the wetland to encroach on the pasture beyond the fence lines. Pest fish, including rudd, also have a further impact on water quality and biodiversity values.

Existing collaboration and restoration efforts

Before Living Water began in 2013, there was a growing emphasis on collaboration among agencies and communities to protect and restore the Waikato Peat lakes. Key initiatives included:

- **Waipā Peat Lakes and Wetlands Accord (2002):** This partnership between WRC, DOC, WDC, Ngā Iwi Tōpū o Waipā and Auckland/Waikato Fish and Game Association is focused on working cooperatively with landowners, mana whenua and interest groups to restore and enhance the lakes and wetlands in the Waipā District.
- **Waikato Regional Council** loaned **Waipā District Council** \$650,000 in 2005 to actively purchase private land around the lakes. This helped complete the pest-proof fence around Maungatautari Ecological Island. WDC also developed subdivision policies to secure additional esplanade reserves around the lakes.
- **Waikato District Lakes and Wetlands Memorandum of Agreement (2011):** Signed by WRC, DOC, Waikato-Tainui, Waikato District Council and the Auckland Waikato Fish and Game Council, this agreement prioritises restoration projects, effective resource utilisation, and seeking additional funding. As a result, an Inter-agency Action Plan and a Habitat Enhancement Plan for Lake Areare were developed, laying a solid foundation for Living Water, and securing funding from the Waikato River Authority (WRA) for restoration actions.

Restoration efforts prior to Living Water included:

- **Lake Areare:** DOC fully fenced the area to exclude stock and controlled weeds. Replanting efforts on public land around the lake margin involved multiple stakeholders and volunteers, including Fish and Game and the Living Legends project. As part of SH1 development mitigations by Waka Kotahi/ NZ Transport Agency, a constructed treatment wetland was developed. A weir was also installed in 2005 and upgraded in 2008 to maintain water levels during the summer period.
- **Lake Ruatuna:** The lake was mostly fenced with an extended riparian margin (60-70m wide) by WDC, which also purchased additional esplanade reserve areas. The council intended to establish constructed wetlands/sediment traps to reduce nutrient inputs to the lake. DOC, WDC and other volunteer groups undertook weed control (particularly willow) and planting within the riparian margin. WDC led the planting of a newly acquired esplanade and initiated willow control using manual methods.

- **Rotomānuka lakes:** In 2006 a weir was installed and DOC undertook pest control, riparian fencing, planting and macrophyte research. WDC and WRC proactively purchased land adjacent to the DOC reserve to extend buffer zones around the lake. The NZ Landcare Trust collaborated with landowners and the community to develop a community catchment plan, including sediment ponds and infiltration wetlands, ‘whole farm’ plans, and community plantings. The National Wetland Trust, with support from WDC and Waikato Clean Up Trust (WRA), constructed a predator-proof fence around Rotopiko East lake and carried out extensive pest control. This supported the reintroduction of threatened birds and animals to the area.

1.2.3 Programme development

As well as being located in intensive dairying catchments, the three peat lakes were selected as Living Water sites because of their high visibility from the road. They were identified as priority areas through discussions with agencies already in the catchment, and there was existing work to build upon.

The Waikato Peat Lakes programme, reflecting Living Water’s three-phase process across all sites, began by establishing foundational relationships, collecting baseline data, and implementing focused restoration initiatives. After a strategic reset, the programme shifted towards a more targeted, systemic catchment approach.

Getting started

One of the first steps for this site was gathering information to support project planning and implementation. It also involved building relationships, and establishing how to effectively work together as partners. This required an understanding of each other’s strengths, connections, agency processes and resources. The focus was also on achieving early successes, by building on existing efforts, such as the WRC’s farm planning work, the NZ Landcare Trust’s community catchment projects, and collaborative agreements like the Waikato Lakes MOA (mentioned above).

Environmental information summaries were commissioned for each lake catchment to inform planning for catchment interventions. Important knowledge gaps were identified, including catchment hydrology, aquatic biodiversity, and understanding of pest fish populations, for more effective management.

Engagement with mana whenua for the three lakes - Ngāti Apakura, Ngāti Mahuta and Ngāti Wairere - was also commissioned to develop a mātauranga Māori workstream and facilitate working relationships with Living Water. Connections were also made with surrounding landowners/farmers, some of whom later became key to the programme’s progress. Community open days, planting around the lake margins, small-scale fencing and retirement of land from grazing were part of the on-the-ground delivery work in this phase. Sediment traps were also installed at Lakes Ruatuna and Rotomānuka, and predator traplines were established around each lake, with the support of local volunteers. Initiatives to control pest plants, particularly willow, were also initiated.

Strategic reset and refined priorities

In 2016, the national Living Water programme reviewed and revised its national strategy. The focus changed from 'environmental restoration' to a more systems-focused learning and 'proof of concept' programme, emphasising partnerships, trialling tools and scaling up 'solutions'. The strategic planning process ("Google Sprint Planning") for the Waikato Peat Lakes sites (and all other Living Water sites), involved various stakeholders, including iwi representatives, councils, landowners and community groups. The resulting Waikato Peat Lakes site plan (and logic model) sharpened the focus on Lake Ruatuna to achieve the greatest impact in the available time.

The initial aim of this phase was to transform Lake Ruatuna into a demonstration site with tangible restoration outcomes. An investigation into re-introducing submerged macrophytes in the lake was determined to not be feasible due to tannin levels impeding macrophyte growth. However, the feasibility study led to other interventions to improve water quality. The freshwater pest plant *Ludwigia* (water primrose) had spread and established around the lake edge, dominating most of the shallow water and sediment traps, restricting water flow. Research into control methods led to herbicide application by drone, eventually extending to include willow.

Efforts with the main farms surrounding Lake Ruatuna were increased, with completion of Farm Environment Plans (FEPs) to guide freshwater mitigation priorities. On-farm priority fencing and planting began, while a multi-season research initiative into lake contaminant sources was undertaken. The FEP results and contaminant research were combined to identify further areas for retirement, fencing and planting. Hydroseeding trials were conducted on farms near Lakes Ruatuna and Rotomānuka but results were marred by droughts and seed viability.

Ngāti Apakura were also particularly interested in exploring opportunities at Lake Ruatuna. The lake surroundings, including an esplanade reserve and facilities for community use, presented an opportunity to build on hapu and community relationships. Living Water worked closely with Ngāti Apakura representatives to develop a pā harakeke and rongoā garden in an area previously infested with privet and blackberry near the amenity facilities. The aim was to create an area ideal for cultural values education, resource and celebration while enhancing the scenic aesthetic. DOC's "Good to Grow" partnership with the Department of Corrections, adopted Lake Ruatuna as their first site, revitalising the amenity block and reserve area.

While most effort and resources shifted to Ruatuna, a 'watching brief' continued at the other lakes, fulfilling existing commitments such as planting extensive drain networks and providing funding and support as required to existing groups and initiatives. General bird surveys were refined to focus solely on spotless crane/ pūweto, a wetland health indicator species, but continued at all three lakes.

Final phase and transition

In late 2020 Living Water recognised the potential for greater efficiency and overall environmental benefit by aligning the programme with an existing catchment restoration programme that was already underway in the Manga-o-tama catchment. This was also prudent as the Living Water partnership was ending in 2023, and there was a desire to transition smoothly out of the 10-year programme by strengthening linkages with those ‘remaining’ in the catchment.

Hui were held, leading to an alliance between mana whenua, landowners, territorial local authorities, and stakeholders. A project proposal was developed, funding secured, and a Mana Enhancing Agreement signed between Ngāti Apakura, Mangaotama Stream and Wetland Restoration Trust (MSWRT), NZ Landcare Trust, Fonterra, Waipā DC, Waikato Regional Council, Department of Conservation, and Living Water partnership. The WRA funding was to assess the catchment and identify areas for freshwater protection and enhancement activities. Living Water, WRC and the WRA then funded the highest priority mitigations, supported by Fonterra SDA’s. The priority interventions included extensive opportunities for school planting days.

While the Living Water Partnership was to officially end in June 2023, the Department of Conservation and Fonterra committed to seeing the Mangaotama project through the first round of freshwater mitigation activities (to December 2023), supporting the basis for ongoing work.

Wrap up work at Lake Ruatuna was significantly impacted by a year of heavy rainfall, which flooded the reserve and neighbouring paddocks. At this stage the focus shifted to ensuring the structural soundness and functionality of the work done, particularly off Public Conservation Land. This included targeted pest plant control on-farm, and carefully curated planting of the sediment ponds. The ponds were a high priority due to varied functionality, often stagnating over summer and flowing too fast in winter.

A floating wetland made of raupō and flax flower stalks and supporting a number of *Carex* grasses, was trialled in one pond. The structure, modelled on a mōkihi, was developed by Ngāti Apakura representatives as an alternative to the plastic structures often utilised. The design was highly successful, staying afloat for at least 8 months, with the *Carex* grasses growing rapidly, showing strong potential for nutrient removal from the inlet water sources. The pā harakeke was also thriving and, while still a few years from harvestable, was potentially one of the most successful outputs among the Lake Ruatuna activities.

Work will continue independently by the Living Water partners in all three lake catchments (Lakes Areare, Ruatuna and Rotomānuka) as they did before the Living Water programme. All the lakes are included in DOC’s ecosystem management system and will remain part of the department’s ecological and restoration operational planning. Discussions are underway with WDC to explore resource pooling to maintain gains made at Ruatuna, Rotomānuka and Rotopiko.

1.3 Programme milestones

The following timeline highlights key milestones and significant achievements of the programme in the Waikato Peat Lakes catchment. These milestones mark important moments of progress, collaboration, and impact, showcasing the programme journey, its evolution, and its outcomes.

2013	2015	2016	2017	2018
<p>Project launch Connecting with communities, farmers and stakeholders in the lake catchments. Volunteer planting days undertaken.</p> <p>Collation of existing data to understand baselines begins Identification of issues and baseline data on and off-farm carried out.</p>	<p>Mana whenua initial hui held in Hopuhopu Started dialogue between Living Water and Ngāti Apakura, Ngāti Mahuta and Ngāti Wairere about goals, aspirations and outcomes for the lakes.</p>	<p>First sediment traps installed Inputs to the lakes from surrounding farm land are a significant problem and sediment traps were considered a tool to manage this at scale.</p> <p>Floating wetland trialled Floating wetland was installed at inflow to Lake Areare to trial in-drain treatment approaches and provide instream habitat.</p>	<p>Sprint planning exercise The Google SPRINT strategic planning process engaged diverse stakeholders and led to refocusing efforts on Lake Ruatuna.</p> <p>Baseline pūweto/spotless crane surveys Pūweto, a key indicator species for wetland restoration, were surveyed and tracked to determine habitat preferences.</p>	<p>Ōhaupō Community Association introduces Peat Lakes town 'welcome' signs A visible recognition of the community valuing and connecting with the peat lakes, and raising awareness for visitors.</p> <p>Macrophyte reintroduction (translocation) trial investigation This was to be a significant in-lake restoration trial, but investigations found unsuitable light conditions for macrophyte reintroduction at Lake Ruatuna.</p>
2019	2020	2021	2022	2023
<p>'Good to Grow' partnership between DOC and Department of Corrections Through the partnership, community service workers contributed significantly to planting, maintenance and weed control at Lake Ruatuna.</p> <p>Water Quality Survey Report on sediment trap performance Provided lessons on sediment trap performance and practical ways to reduce sediment and nutrient flows, motivating on-farm action in riparian zones.</p>	<p>Pā Harakeke and rongoā garden developed for Lake Ruatuna 11 varieties of harakeke were planted along with a rongoā garden to support Ngāti Apakura aspirations for cultural reconnection and use of the land.</p> <p>Linking with the Mangaotama Stream & Wetland Restoration Trust This land owner initiative enabled Living Water to scale tools from individual farms to a larger catchment, linking community restoration with broader collaboration efforts.</p>	<p>Funding secured for the Manga-o-tama catchment restoration Waikato River Authority funding helped landowners scale up restoration and improve water quality, using new tools and technology for greater impactCAPture GIS tool trial.</p>	<p>Mana Enhancing Agreement signed Formalised commitments from key Manga-o-tama catchment stakeholders, mana whenua and council to support and work together on catchment restoration initiatives over a 2 year period.</p> <p>Mōkihi floating wetland launched at Lake Ruatuna Ngāti Apakura representatives developed their own floating wetland design using only natural materials.</p>	<p>Implementation of Manga-o-tama catchment interventions Following prioritisation of areas for freshwater enhancement - weed control, sediment trap construction, and targeted fencing/planting were undertaken with landowner buy-in.</p>

Table 1: The Waikato Peat Lakes programme milestones and timeline

1.4 Theory of change

A Theory of Change (ToC) describes how we think change happens. A programme's ToC serves as a foundational roadmap, outlining the desired outcomes, the steps necessary to achieve these outcomes, and the causal relationships between these actions and outcomes. It fosters a shared understanding that is essential for both coordination and evaluation, encapsulating the programme's context, a logic model, and its underlying assumptions. This framework is instrumental in articulating a programme's intended achievements, providing a basis for both coordination and evaluation.

The initial ToC for all the sites under the Living Water programme was broadly oriented towards holistic environmental and community well-being outcomes. This encompassed supporting diverse wetland ecosystems, embedding biodiversity within sustainable dairy farming practices, enhancing water quality and biodiversity through knowledge sharing, documenting the programme's impact, revitalising cultural and natural heritage, and elevating awareness of ecosystems' roles in community health. Several main activity themes were organised around ecosystem enhancement - farm management sustainability, community and iwi support, research and monitoring, and effective storytelling.

Living Water's National Strategy was revised in 2017, moving from a predominantly on-the-ground 'restoration' programme to a 'proof of concept' focussed more on testing tools and approaches that could be scaled and sharing lessons along the way, both successes and 'failures'. The National Planning Monitoring & Evaluation Framework followed in 2018.



Schools were actively involved in on-farm plantings as part of the Manga-o-tama Catchment Project.

1.4.1 Logic model

Following the strategic realignment in 2017, the programme team identified key strategic activity areas for the Waikato Peat Lakes site. These were envisioned to guide the programme towards success, as depicted in the accompanying 2018 logic model (Table 2). They emphasised activities and outcomes to help restore unique peat lake systems.

Activities	Outputs	Medium term outcomes (by 2023)	Longer term outcomes
In-Lake: Address legacy nutrient and sediment levels in one peat lake	Baseline assessments and in lake trials	In-lake intervention demonstrates improving water quality in one lake	Healthy resilient lowland freshwater ecosystems
Lake-margin: Trialling interventions that intercept and reduce sediment and nutrients entering the lakes and that create a self-sustaining native lake environment	Fencing, access paths, native planting of lake margins, weed and pest control Intervention trials Farm Environment Plans Farm management solutions, edge of field and catchment interventions	Improved habitat for native wetland birds Interventions in the catchment result in a reduction of sediment and nutrient inflows into Lake Ruatuna Communities and landowners in the catchments value the special characteristics of the peat lakes and are actively involved in their protection and enhancement	Profitable responsible dairying A shared understanding of the interdependence of agriculture, economic & environment by the broader community
Catchment: Trialling solutions to achieve a reduction in sediment and nutrient point-source inputs to one lake	Memorandums of understanding, Mana Enhancing Agreement, management agreements Sharing learnings through website, social media, professional forums, community events	Living Water tools and solutions have been scaled up to other peat lake catchments	
Strategic partnerships: Working with mana whenua, operational agencies & others			
Monitoring our progress, Telling our story and Championing change			

Table 2: The Waikato Peat Lakes logic model (2018)

The Waikato Peat Lakes logic model reflects the programme’s plan starting from its half-way point, when the site’s activities shifted from working across all three peat lake systems, to focusing on the Lake Ruatuna catchment. The medium-term ‘building block’ outcomes reflect the ‘proof of concept’ approach outlined in the National Living Water Strategy. This includes gaining a better understanding of peat lake values, the impacts of activities, and implementing practical sediment and nutrient reduction tools. It also involved promoting the adoption of tools and approaches by farmers and land managers.

1.4.2 Underpinning assumptions and guiding principles

The assumptions and principles outlined below are from the [Living Water National Planning, Monitoring and Evaluation Framework](#) (2018, updated 2020), which served as a foundational reference for the programme's strategic approach.

Causal assumptions are:

- **Partnership:** Effective change requires collaboration, as no single organisation possesses all the necessary resources or influence.
- **Social learning:** Learning occurs through action, reflection, and collaboration, offering new perspectives and pathways forward.
- **Behaviour change:** Enduring change in farming practices involves a comprehensive change cycle, from motivation to the embedding of new habits.
- **Systems thinking:** Addressing change at the individual farmer level is just one aspect; broader systemic changes are also necessary for accelerated impact.

These assumptions align with the Living Water Programme's guiding principles, emphasising collaboration, the integration of mātauranga Māori, knowledge sharing, economic viability, scalability, and the importance of learning and sharing. These principles underpinned the programme's approach to achieving its long-term goals and reflect a commitment to a holistic and inclusive strategy for catchment management.



Living Water worked with Ngāti Apakura representatives to develop a pā harakeke and rongoā garden at Lake Ruatuna to support mana whenua aspirations for the lakes.

2. Inputs, activities and outputs

In this chapter the foundational elements of the Waikato Peat Lakes programme are examined, focusing on inputs, activities, and outputs. The inputs form the backbone (ie. necessary support and direction) of the programme and result in the activities and their associated outputs. These components also served as the driving forces that kept staff engaged and active throughout the programme lifecycle.

2.1 Governance, management and resourcing

Governance and management

The Living Water partnership operated at three levels:

- **Strategic oversight** was managed by the Steering Committee, which comprised senior representatives from both partners, the Department of Conservation (DOC) and Fonterra.
- **National Programme Management** was led by the National Manager, supported by a programme group of staff from both DOC and Fonterra. This group was responsible for the delivery of national projects and maintaining consistency across catchment programmes.
- **Site-level delivery teams** were directed by a full-time DOC Site Lead, with support from DOC and Fonterra staff. DOC was responsible for operational delivery at the site level, working in close collaboration with Fonterra staff. The Site Teams were also supported by a Freshwater Technical Adviser (DOC), and Sustainable Dairying Advisor (Fonterra). These teams conducted project trials and implemented restoration work alongside mana whenua, stakeholders, researchers, contractors, and consultants.

The operating model of Living Water was adapted over the ten years of the partnership as the programme of work moved through three phases:

- Establish, engage, investigate, and ‘quick wins’
- Confirm strategy, consolidate, plan, trial and build alliances
- Share lessons, grow impact

As the Living Water programme entered its final phase (2020-2023), it focused management resources on broadening impact and sharing the tools and insights from the programme more widely.

Inputs - Resourcing, expertise and collaborations

The Waikato Peat Lakes programme has benefited from the knowledge, skills and experience of many people from within the catchment community as well as beyond. These contributions, often difficult to quantify, were crucial yet not always visible or fully recognised in planning or reporting processes. They came from a variety of sources, including:

- **Mana whenua:** Ngāti Apakura, Ngāti Mahuta, Ngāti Wairere, Nga Iwi Tōpū O Waipā (collective representing iwi and hapu in the Waipā area), Ngāti Hikairo, Ngāti Mahanga, Te Mapi Ngāti Haua Mahi Trust, Waikato-Tainui Raupatu River Trust.
- **Local communities and landowners:** Catchment farmers and landowners, the Lake Ruatuna users group, Manga-o-tama Stream and Wetland Restoration Trust, Fish & Game Auckland-Waikato, Ōhaupō Community Association.
- **Councils:** Waikato Regional, Waikato District and Waipā District.
- **Waikato River Authority and Waikato River Clean up Trust**
- **Local schools:** Ōhaupō Primary School, Melville Intermediate School, Te Awamutu College, Paterangi School, Puahue School, and Ngahinapōuri School.
- **National Wetland Trust and NZ Landcare Trust**
- **Department of Corrections:** ‘Good to Grow’ partnership (with DOC) for community service workers and Waikeria Prison inmates.
- **Fonterra:** Hamilton Office-based staff and Sustainable Dairying Advisors.
- **Consultants, researchers, and contractors:** Provided specialised knowledge and technical support.

Inputs – Direct funding

The funding outlined below includes both Living Water funding, and funding leveraged for catchment work.

- Living Water funding: \$3.66 million over 10 years
- Other funding for the Manga-o-tama Ōhaupō Peat Lakes to Waipā River Connection project totalled \$520,000 made up of:
 - Waikato River Authority - \$388,000
 - Waipā District Council - \$30,000
 - Waikato Regional Council - \$102,000

2.2 Activities and outputs

This section explores the tasks undertaken (activities) and the immediate results (outputs). Understanding how actions translate into outputs is essential for assessing the effectiveness of the programme of work. Activities at the Waikato Peat Lakes programme are organised based on the components identified in the site's logic model (see table 2 above). It is important to recognise that these activities are interconnected, rather than isolated.

Initially, efforts were focused on understanding the catchment, achieving 'quick wins' through activities including targeted planting, pest plant and animal control, and establishing local relationships (with mana whenua, landowners, local schools, and lake communities). By 2019, targeted work, trials and initiatives, both on and off farm were well underway, leveraging the extensive baseline knowledge acquired. By 2022 the programme was expanding to support a collaboration between landowners to restore the Manga-o-tama catchment (including Lake Ruatuna), building upon the connections and lessons learned from previous work.

2.2.1 In the lakes

Nutrients, E. coli and sediment flowing into lake systems are problematic for almost all of the 31 peat lakes in the Waikato region. The key focus was to test and verify a potential system-wide nature-based intervention.

Aquatic macrophytes: These play a crucial role in lake systems. They absorb nutrients, bind sediments, provide habitat and food for aquatic biodiversity, buffer wave action, and contribute to oxygen cycling in the water. Living Water commissioned researchers to investigate whether reintroducing native macrophytes to Lake Ruatuna was possible as a way of helping improve the water quality with a view to this approach then being trialled if successful. Unfortunately, the results revealed that the lake's naturally occurring tannins, concentrated by drainage, blocked too much light to support native macrophyte growth.

Pest fish: Living Water tested the use of eDNA to detect pest fish (particularly koi carp) in Lake Ruatuna, as an alternative to the conventional and more labour-intensive methods (like the trapping, or boat electro-fishing) used previously. Surprisingly, no koi carp were detected in the lake, despite their widespread presence in other parts of the Waikato. Pest fish barriers were installed at Lakes Ruatuna and Areare to keep out breeding age koi carp but allow native fish and tuna (eels) to pass through. Pest fishing with nets in Lake Ruatuna continued until 2021, when efforts were hindered by storms, cyanobacteria levels and limited resources.

Pest plants: The introduced aquatic plant water primrose (*Ludwigia*) in Lake Ruatuna became problematic, smothering vegetation, dominating shallow areas favoured by pest fish, affecting fish-down (control) efforts and blocking waterways. Aerial (drone) spraying was tested over 3 hectares, successfully reducing growth. Control was expanded to willow with promising results - the approach was effective in reducing willow numbers, although

less so for juvenile trees and lower canopy growth. Eradication of *Ludwigia* was not possible, as it re-grew yearly, especially in untreated areas, with yearly applications necessary to control it, but the method successfully reduced shallow water growth aiding pest fishing.

Waikato shallow lakes modelling: Developed in partnership with the WRC, DairyNZ, Waikato River Authority, Waikato Regional Council, and Waipa District Council, this study focussed on identifying, evaluating and prioritising specific in-lake and catchment restoration options which could be applied to improve the water quality and ecological health of peat and riverine lakes.

2.2.2 Around the lake margins

Preventing sediments and nutrients from entering the lakes through land runoff, seepage, tributary streams and drains must be addressed alongside managing what is already in the lakes. The Waikato Peat Lakes site programme tackled this challenge through various methods.

Baseline information gathering: To understand contaminant sources in Lake Ruatuna, Living Water collected water quality data from incoming waterways over the course of a year. This identified the contaminants, their sources, quantities and seasonal variations. This informed the identification of priority waterways for interventions and guided planting, fencing and land retirement plans.

Floating wetlands: A 60m² floating wetland was trialled in a farm drain that flows into Lake Areare, consisting of a plastic raft with native plants. The initial assessment of the trial wetland showed promising results in reducing sediment and phosphorus but had mixed results in terms of nutrients. However, a follow up assessment 2 years later revealed that its effectiveness varied greatly and was poor overall. Although there were small annual reductions in phosphorus and nutrients, the size of the floating wetland was significantly smaller than needed for the catchment area, and therefore its effectiveness was limited.

Ngāti Apakura representatives were interested in the wetland concept but disliked the plastic aspect. An alternative mōkihi (traditional raft) was constructed from raupō and kōrari (bullrush and flax flower stalks). This raft, holding six *Carex* grasses, was floated in a sediment pond, was buoyant, stable and lasted long enough to successfully enable the *Carex* to establish in wet areas requiring filtration. The raft did not need to be removed from the pond as it broke down due to its natural materials. Ngāti Apakura representatives are interested in repeating this trial with design tweaks, such as making it larger to hold more *Carex*.

Sediment traps: Designed as a series of ponds at different depths to mimic nature, the sediment traps were installed at the lake edges of Lakes Ruatuna and Rotomānuka to intercept drains feeding the lakes. While early monitoring showed they removed some suspended solids and total phosphorous, this did not continue. In some cases the water flow was too fast for the sediment to drop out, decreased inflow in summer caused stagnation, and in other cases the traps were found to provide ideal conditions for the nuisance plant *Ludwigia*. At Lake Ruatuna, it was discovered that the catchment size had changed, making the pond network insufficient for the volume of water and contaminants.

To improve pond function, kuta (*Eleocharis sphacelate*) was planted in the sediment traps to oxygenate and filter the water and provide a cultural resource for weaving, but few plants survived. Tall native plants were added to the north side for shade, and extra *Carex* were planted around the edges for additional shading, slowing and filtration.

Hydroseeding trial: Hydroseeding of native sedge seeds (*Carex* sp.) at sites next to Lake Ruatuna and at Lake Rotomānuka was trialled to explore a cost effective restoration approach compared to conventional planting, especially in steep areas. Three trials were conducted: two in an undulating seepage area and the other on an elevated riparian margin. The first trial had to be repeated due to issues with seed viability. The second trial was impacted by drought conditions which highlighted the specific conditions required for this method to be successful.

Riparian habitat and fencing: Riparian planting and increasing fence set-backs are essential parts of reducing sediment and nutrients from reaching streams, rivers and lakes. Early in the programme Living Water initiated a volunteer and mana whenua training project on weed removal and restoration around sensitive environmental areas, enabling some restoration and maintenance to be carried out by local groups instead of contractors. Extensive planting occurred in all three lake margins and on surrounding farms.

Insights from pūweto (spotless crane) radio tracking and call-playback surveys showed a preference for thick, partially submerged wetland vegetation like raupō, and willow branches, which are often found in riparian margin habitats. These areas provide essential cover and pathways over open water. Nesting was observed in shrubs on the drier, planted lake esplanade. Trials were also undertaken to study habitat range and preferences through mark-recapture methods, transmitter attachments, and radio tracking.

Building relationships and community action: Building relationships and linking with local communities were key parts of the programme. Ōhaupō Primary School, Melville Intermediate, Te Awamutu College and community services workers under the ‘Good to Grow’ partnership participated in restoration work around the Lakes Ruatuna and Rotomānuka. New relationships with mana whenua were facilitated to identify lake aspirations. Lake Ruatuna emerged as a great opportunity for improving cultural values with space for a pā harakeke and rongoā gardens replacing privet, blackberry and inkweed.

Lake Ruatuna proved popular with schools and organisations due to its accessibility, facilities and learning opportunities, including restoration, endangered species, predator control, water sampling and cultural values. Over the programme’s lifetime 30,000 native plants were planted by students and staff. Local community members conducted predator control, and early native planting at all three peat lakes. Living Water established predator trap networks around the lakes, with volunteers now maintaining about 178 traps. The local community has also been involved in planting and pūweto (spotless crane) call-playback monitoring.

Lake restoration also inspired the Ōhaupō township to adopt the peat lakes as their town identity. With funding support from Living Water they put up signs reading “Home of the Peat Lakes” at town entry points and decorated the bus stops with murals of different wetland birds.

2.2.3 Catchment approaches

Living Water collected data, trialled projects to improve water quality, and built relationships since the beginning of its 10-year programme. By 2020, it was recognised that a catchment approach aligned with ongoing restoration work could achieve greater environmental benefits.

In the Manga-o-tama catchment, which includes Lake Ruatuna, landowners were already working together on tree planting and pest control. A hui resulted in strong interest from all parties, leading to an alliance forming with landowners, mana whenua, local authorities, and stakeholders. A collaborative project proposal was developed, supported by funding commitments of \$533,000 from the Living Water Partnership, \$102,000 from WRC and \$30,000 from WDC. The proposal to the Waikato River Clean Up Trust was awarded \$388,000 over two years for the Manga-o-tama, Ōhaupō Peat Lakes to Waipā River: Catchment Restoration Project. A Mana Enhancing Agreement was signed between Ngāti Apakura, Mangaotama Stream and Wetland Restoration Trust (MSWRT), NZ Landcare Trust, Fonterra, WDC, WRC, DOC, and the Living Water partnership.

The Manga-o-tama catchment collaborative projects included:

- **Baseline and monitoring information:** Identifying sources of sediment and nutrients to prioritise areas for improvement and assess the effectiveness of actions. Real-time water quality testing was added to the two key tributaries of the Manga-o-tama catchment. Baseline aerial photography was used to provide pictorial information and show progress over time.
- **Risk mapping:** A desktop exercise assessing risks to water quality, followed by ground truthing that identified 20 high priority sites for freshwater protection/ enhancement interventions.
- **Farm environment plans:** Fonterra’s Sustainable Dairying Advisors completed FEPs for 35 of the 38 Fonterra farms in the catchment. Six other “high priority” farms also went through an FEP process.
- **Mana whenua values and priorities:** Cultural values, wellbeing and heritage assessments by Ngāti Apakura and Ngāti Mahanga identified pest fish, improving tuna habitat and migration pathways as priorities. Ngāti Apakura also undertook scoping work for Lake Ngāroto/Wairoto, another nearby priority peat lake for mātauranga restoration.
- **Targeted on-farm native planting:** Over 40,000 native plants were planted on farms around wetlands, lakes and streams to buffer farm runoff and create ecological corridors for native biodiversity, including birds and bats. In total 20 hectares within the catchment have been improved.
- **Fencing:** 7km of fencing was erected to protect seepage areas and increase setbacks for riparian planting as well as on-farm remnant kahikatea stands.
- **Pest control:** Willow and privet are significant issues along the streams, wetlands, and tributaries. Koi carp also impact water quality. Pest plant control was targeted within the catchment, and a koi carp barrier is being investigated for (Lake) Ngārotoiti/ Wairotoiti.

While the formal Manga-o-tama partnership received funding for two years, this work is well-aligned to continue, with improved linkages with the Waipā District Peat Lakes and Wetlands Accord partners.

2.2.4 Strategic partnerships

Living Water recognised the need for broader partnerships and collaboration to achieve the desired outcomes. Throughout the Waikato Peat Lakes programme, significant collaborative relationships were formed.

Mana whenua: In the initial stages, a consultant was engaged to help establish new relationships between Living Water and mana whenua. The consultant helped identify representatives their values, aspirations and opportunities for mātauranga Māori for the three peat lakes. Following the strategic reset at the midway point the focus shifted from Lakes Areare (Ngāti Mahuta, Ngāti Wairere) and Rotomānuka (Ngāti Apakura), to Lake Ruatuna. In this next phase of the programme, the relationships with Ngāti Apakura for Lake Ruatuna transitioned fully to the site leads and were more focussed on action on the ground.

The resulting work included the development of a pā harakeke (flax garden), and carefully selected plant species for rongoā (traditional medicine) or weaving values. Eleven different varieties of harakeke were planted with the intention of them being used for traditional raranga (weaving). Annual planting in the surrounding area included kūmarahou, karamū, mingimingi and kawakawa, all useful for either rongoā or dyeing or flax processing. Ngāti Apakura representatives also created a floating wetland using naturally occurring wetland plants, raupō and kōrari (bullrush and flax flower stalks), as an alternative to the commonly used plastic structures. They used a traditional mōkihi (raft) as the structure, combining the ‘western’-constructed wetland mitigation concept for reducing contaminants, with traditional Māori cultural practices.

Good to Grow - DOC and the Department of Corrections: The Department of Corrections adopted Lake Ruatuna as a work site in 2019 with community service workers periodically contributing to site maintenance. Their tasks included planting, plant thinning, fencing, weed control, predator trap construction, painting, track upgrades and pā harakeke maintenance. The rapid growth of pest plants and grass posed a significant threat to young native plants, making the contribution to controlling them highly valued. Inmates from Waikeria Prison also built picnic tables and additional predator traps for the lake reserve in the prison workshop. Support was also provided to community initiatives aiming to contribute to the esplanade restoration at the lakes, through funding, advice or specialised contractors, and at other times traps, trap lures, plants or herbicides. Such support helped foster community engagement and empowerment.

Manga-o-tama partnership: In the final phase of Living Water, a Mana Enhancing Agreement was signed between Ngāti Apakura, Mangaotama Stream and Wetland Restoration Trust, NZ Landcare Trust, Fonterra, Waipā District Council, Waikato Regional Council, DOC, and the Living Water partnership. This agreement formalised cooperation in the broader Lake Ruatuna catchment for the Manga-o-tama, Ōhaupō Peat Lakes to Waipā River: Catchment Restoration Project. This partnership, extending beyond the duration of

Living Water, also aligns with the priorities of the Waipā District Peat Lakes & Wetlands Accord (established in 2002) to work collaboratively with landowners, iwi and interest groups to restore and enhance the peat lakes.

2.2.5 Monitoring and evaluation

Living Water developed a monitoring and evaluation plan for the Waikato Peat Lakes site based on the National Framework. This plan covered environmental, economic, social, and organisational progress and outcomes. At the Waikato Peat Lakes, monitoring included:

Bird monitoring: Annual monitoring of pūweto/spotless crane populations using call-playback. Pūweto are an indicator species of wetland health and can increase numbers where environmental conditions are favourable. Monitoring was conducted for seven years at Lakes Ruatuna and Rotomānuka (fewer years at Lake Areare due to resource constraints). Lakes Ruatuna and Rotomānuka showed a slight increase in bird numbers, although results may have been affected by drought, flooding and data limitations. Increases in numbers may be linked to high quality predator trapping around Rotomānuka North Lake, and extensive planting (habitat increases) both around Lake Ruatuna and its surrounding waterways.

Vegetation surveys: Aerial mapping was used to determine the extent of *Ludwigia* and willow, two pest plants, at Lake Ruatuna. The mapping showed a decrease in live willow each year, but the overall coverage of *Ludwigia* remained similar. The herbicide application trials successfully reduced and maintained reduced coverage by *Ludwigia* over the open water of the lake margin. It was concluded that willow eradication is possible at this site, but annual efforts are needed to control *Ludwigia*, especially in areas where it could block waterways.

Pest fish surveys: A combination of environmental DNA (eDNA), boat electric fishing and netting were used to detect and control pest fish at Lake Ruatuna. The absence of koi carp was determined using these combined techniques. A pest fish barrier was installed at the outlet drain to prevent the entry of migratory breeding-age koi carp. Smaller fish and tuna (eels) are still able to pass through the barrier.

Water quality monitoring: Water quality samples were collected from Lake Ruatuna on a bimonthly then a monthly basis. A study was also conducted to assess the water quality of all waterways entering Lake Ruatuna to help determine the type, source, quantity, and timing of contaminants entering the lake. The study evaluated the effectiveness of the largest sediment trap system. The findings helped prioritise and target freshwater protection measures on surrounding farms and found that the largest sediment pond system was undersized due to increased drainage from sub-catchments. This led to improvements in all the sediment ponds around the lake.

Two sensors were also installed in the Manga-o-tama catchment as part of the Manga-o-tama restoration project to help evaluate the impact of project initiatives on water quality.

2.2.6 Telling our story and championing change

The Waikato Peat Lakes programme advocated for change, tracked progress, and told the programme story using a variety of techniques. Living Water staff have utilised a range of methods to drive change and share its narrative. Media engagement was key, with Living Water staff actively sharing milestones on platforms like LinkedIn, Twitter (now X), through local and national media and the programme's website. The Living Water website serves as a repository of in-depth case studies and updates (see Appendix I for links). Collectively, those records not only offer a comprehensive view of the various activities and projects and their associated contexts but also delve into specifics like project costs, lessons learnt, and the communities involved.

Peat Lake's strategic digital outreach and hands-on experiences helped showcase the programme and its activities and lessons. Field trips involving the farming, agencies and science communities, Fonterra and DOC staff, school children and local catchment communities offered participants first-hand views of the programme's initiatives and lessons.

Over the life of the Living Water partnership, progress on projects and lessons across the five sites were shared and advocated to central and local government and key organisations, such as the NZ Landcare Trust, who continue to support better outcomes for farming, freshwater and biodiversity. These initiatives also included collaborations with academic institutions, sponsorship and participation in conferences and symposiums demonstrated wider community engagement efforts.



The cryptic native pūweto/spotless crane is a good indicator of wetland health. Living Water contributed to monitoring of pūweto at Lake Ruatuna to assess changes as a result of restoration.

2.3 Outputs - by the numbers

Many indicators help assess success across multiple workstreams. These metrics are particularly useful for acknowledging progress in achieving outputs (the goods and services delivered by the programme).

15 projects	7 trials	178 predator traps installed around the lakes
100% of Fonterra farms in the 3 lakes catchments have a Farm Environment Plan	200k natives planted at Lakes Ruatuna, Rotomānuka and Areare	28ha of habitat enhanced around Lakes Ruatuna, Rotomānuka and Areare
40k natives planted on-farm in the Manga-o-tama catchment	7km of fencing to protect wetland and riparian areas in the Manga-o-tama catchment	92% of Fonterra farms in the Manga-o-tama catchment have a Farm Environment Plan
20ha of habitat enhanced in the Manga-o-tama catchment	\$3.6m invested over 10 years	\$520k leveraged for restoration activities in the Manga-o-tama catchment

3. Outcomes - results and themes

This chapter highlights the impact of the Waikato Peat Lakes programme, looking at who and what has changed (outcomes) that Living Water contributed to. The 2018 Living Water (refer section 1.4) identified a number of intermediate outcomes. These outcomes, expected in the short to medium term (5-10 years) are crucial steps and foundational to the achievement of the desired long-term goals (outcomes). The Living Water Logic Model acknowledges that the desired long-term goals and the changes they bring at both the ecological and social levels, happen over longer timeframes (15-20 years plus), so the full impact of Living Water activities will not be visible within the 10-year time frame of the Living Water programme.

For the Waikato Peat Lakes, key intermediate outcomes related to reducing sediment and nutrients entering lake catchments, improving peoples' view of the value of the lakes, building connections with and recognising cultural aspirations of mana whenua.

This chapter explores the contributions of Living Water to the outcomes at the Waikato Peat Lakes site, presented through two frameworks:

- Results Table: offering a quick snapshot of progress based on the site's logic model, and
- Outcomes by theme: highlights broader changes resulting from the programme.

These frameworks clarify how specific actions align with Living Water's overall goals and show the tangible and intangible changes in the community and ecosystem due to the programme's efforts.

Outcome themes for the Waikato Peat Lakes site include organisational changes, relational changes, ecological changes and valuing the environment, capability/ capacity changes, financial investment and impact and scaling up and out.

It's important to note that the organisational changes and outcomes for the two Living Water partner organisations (see 3.2.1 below) are the result of collective efforts across all five catchments involved in the programme. Each catchment, including the Waikato Peat Lakes programme, contributed to these overarching changes, underscoring the collaborative impact of the five Living Water catchment initiatives.

3.1 Results table

This table offers a snapshot of the progress made towards the outcomes identified in the site's 2019 logic model (refer to section 1.4 Theory of Change for a summary version of the logic model and its underlying assumptions). It provides a brief overview of the outcomes and contributions towards achieving them.

Short and medium-term outcomes

Contributions to outcomes

Approach identified to address water quality in one lake via an in-lake intervention. The intervention demonstrates improving water quality.

Testing the feasibility of re-establishing native macrophytes in Lake Ruatuna to improve water quality (and wider ecosystem health) showed it would not be viable for this lake given the light conditions (heavily peat-stained water). While disappointing, it provided useful lessons applicable to other lake systems contributing to the understanding of complex peat lake ecosystems.

The 'in-lake' focus then moved to testing aerial spraying of a selective herbicide to address aquatic pest plant issues (*Ludwigia* and willow) which was shown to be successful for willow and temporarily for *Ludwigia*, both in terms of effectiveness and efficiency (reducing time and costs). eDNA was also tested as a potentially more efficient tool for detecting the presence of pest fish species - in this case koi carp.

Water quality in Ruatuna continues to be 'poor' or 'very poor' based on standards. However, the actions that have been taken to exclude stock and replant riparian areas will eventually have a positive impact, though there is a lag time before results become noticeable.

Lake margins are becoming increasingly dominated with native plant species and pests and weeds are being controlled. Improved habitat for native wetland birds

As well as raising the profile of native wetland birds in the community, habitat improvements have included predator control, pest plant control, targeted riparian planting, stock exclusion from waterways and land retirement from grazing.

Over the course of the programme at least 200,000 native plants were planted across the three lakes including 60,000 in the esplanade reserve of lake Ruatuna. Riparian areas designated as reserves were also expanded through a WDC land purchase as well as the fencing and retirement of small seepage areas previously used for grazing.

Hydroseeding *Carex* grass seeds was also trialled as an alternative to labour-intensive planting, particularly for hard to reach places. Three trials were run, with one successfully establishing *Carex* and seed viability and then drought conditions affecting the other two. This technique was not pursued further after the third trial.

A pā harakeke and rongoā garden now occupy areas previously inhabited by pest plants, and pest fish barriers protect lakes Ruatuna and Areare, still allowing native fish and eels to pass through.

Monitoring of the pūweto (spotless crane) population, an important indicator species of wetland habitat quality, showed a small increase across the seven years of monitoring at Lakes Ruatuna and Rotomānuka.

A total of 28 hectares of habitat have been enhanced: 16 hectares in Ruatuna and its immediate surroundings, 5 hectares in Areare, and 7 hectares in Rotomanuka. An additional 20ha on-farm within the Manga-o-tama catchment have also benefited from native planting and fencing.

Short and medium-term outcomes

Contributions to outcomes

The benefits of sediment traps are understood and nutrient and sediment point sources into Lake Ruatuna have been identified. Interventions in the catchment result in a reduction of sediment and nutrient inflows into Lake Ruatuna.

The sediment trap trials at lakes Ruatuna and Rotomānuka provided insights on the importance of design for the specific context, considering how water flow, speed and volume impact on effectiveness. Unintended consequences, such as creating habitat that favours pest plants, and the need for ongoing trap maintenance (clearing sediment) were highlighted, along with steps to address these issues and improve function.

Sediment ponds/traps are useful in the right location, but the examples at Waikato Peat Lake were installed before completing FEPs and catchment contaminant research. It is recognised that constructing traps at the bottom of the catchment (i.e. the lake edge) misses opportunities to catch contaminants at their source, leading to high loading in sensitive wetland areas surrounding the lakes.

These lessons guided work in the Manga-o-tama catchment, where a survey was conducted before progressing any new on-farm interventions. The survey identified suitable locations for sediment traps, which were installed on-farm and in drains. This kept the trap scale relevant to the water volume, making it manageable and keeping the contaminants on-farm. In addition, early installation of real-time water monitoring stations provided an early picture of the catchment water quality and aided progress tracking.

Mana whenua are actively involved in Living Water projects and mātauranga Māori is integrated into work.

Through ongoing relationships and dialogue with Ngāti Apakura, a number of joint projects were initiated supporting their vision and priorities for Lake Ruatuna.

One of the initiatives suggested by Ngāti Apakura representatives was the pā harakeke, which was planted with eleven different varieties highly valued by weavers. Each variety is accompanied by an interpretation that describes its geographical origins and suitability for different raranga (weaving) projects. There is room for additional varieties to be added to the site, and the accessibility and facilities make it capable of hosting raranga hui in future. Ngāti Apakura representatives also provided guidance on the most desirable plants for a rongoā and raranga support garden.

In an effort to enhance the function of the sediment traps, Kuta was sourced and planted as it not only helps oxygenate and filter the water, but it can also be used in raranga projects. Unfortunately, despite multiple attempts, the project did not manage to establish any plants.

However, Ngāti Apakura representatives expanded on the idea of improving water quality through naturally occurring in-lake interventions. They constructed a floating wetland using a mōkihi (traditional raft) made from raupō and flax flower stalks that supported the growth of *Carex* grasses. It proved to be buoyant, stable and lasted long enough to support the establishment of *Carex* before eventually biodegrading.

Short and medium-term outcomes	Contributions to outcomes
<p>Communities and landowners in the catchments value the special characteristics of the peat lakes and are actively involved in their protection and enhancement.</p>	<p>Six local schools have been involved in the Waikato Peat Lakes programme contributing to planting initiatives and taking part in education initiatives. The Ōhaupō community also adopted the peat lakes as part of their town’s identity, reflecting the lakes and native wetland birds in signs and bus stop murals.</p> <p>Good relationships with neighbouring landowners, farmers and farm managers enabled significant work on the waterways entering the peat lakes. On-farm biodiversity assessments were undertaken on 3 farms. Farmers also contributed materials and/or labour for fencing and retiring seepage areas. Some landowners and lake-users also helped with predator control efforts to support vulnerable wetland bird populations.</p> <p>Living Water supported the Manga-o-tama catchment landowners restoration through a collaborative project with Ngāti Apakura, Mangaotama Stream and Wetland Restoration Trust, NZ Landcare Trust, Fonterra, WDC, WRC and DOC. In addition to Living Water funding, a further \$520,000 was contributed by partners and a grant from the Waikato River Authority for the Manga-o-tama, Ōhaupō Peat Lakes to Waipā River: Catchment Restoration Project. This support included planning, prioritisation, planting, constructing treatment wetlands and fencing.</p> <p>Seven kilometres of fencing was installed, 40,000 natives planted, with 20 hectares in the catchment enhanced, and FEPs have been completed for 92% of Fonterra farms in the catchment.</p>
<p>Living Water tools and solutions have been scaled up to other peat lake catchments.</p>	<p>Two examples of practices used in the Waikato Peat Lakes programme that have been scaled up to other catchments are:</p> <ul style="list-style-type: none"> • Work undertaken across the Living Water sites helped inform planning and action in the Manga-o-tama including overall project design, and prioritisation planning (right tool in the right place). • Supporting mana whenua innovations, such as floating wetlands as nature-based solutions, and promoting interest nationally through media and conferences

Table 3: Waikato Peat Lakes programme results table

3.2 Outcomes by theme groupings

The following outcome theme groupings reflect the people-centred changes that influence the long-term outcomes sought. Examples and snapshots reflect changes that the Living Water programme has contributed to.

3.2.1 Organisational changes

Organisations are dynamic, inherently complex and relational, and changes to their functioning are influenced by multiple factors. Notably, Living Water has contributed to adjustments in ‘business as usual’ practices and commitments, rather than initiating or directly leading these changes. It’s crucial to recognise that the changes and outcomes experienced by the two Living Water partner organisations are due to collective efforts at all five Living Water sites. Each site, including the Waikato Peat Lakes, played a role in these broad changes, highlighting the collaborative impact across the Living Water catchments.

The partnership enabled staff directly involved from both organisations to gain a deeper understanding of each other’s perspectives, reducing polarisation. This fostered a more collaborative environment where solutions were jointly identified and trialled. As a limited-term partnership, it was important that other local partners committed to sustaining the gains over time. Various stakeholders have made organisational changes and commitments because of Living Water.

Fonterra: The influence of the Living Water partnership led to organisational changes within Fonterra in some of the following ways:

- Directly supported the development of a digital platform for farm environment plans (FEP), trialled on Ararira LII catchment farms. This resulted in the integration of regionally specific environmental information within the FEP tool (such as soil types, physiographic information, significant habitats) and access to biodiversity information and accelerated the delivery of FEPs by Sustainable Dairying Advisors (SDAs).
- At a broader system level, through Living Water’s support for the national Farming with Native Biodiversity pilot, Fonterra developed its own formal in-house capability and training for SDAs so they can directly support farmers with biodiversity on-farm.
- Lessons from Living Water influenced the design of Fonterra’s Sustainable Catchments programme and guided how strategic decisions about partnering with the right people and groups in the right places to achieve objectives.
- Lessons from Living Water guided how and who Fonterra supported for system level change, such as Fonterra supporting the development and use of LandscapeDNA with Fonterra farmers and continued Fonterra involvement in the Whakamana Te Waituna partnership in Southland.

Department of Conservation: The influence of the Living Water partnership led to organisational changes within DOC in some of the following ways:

- Over the past decade, the Living Water programme has influenced the Department’s approach to conservation and biodiversity management, both on and off the conservation estate. The insights gained from Living Water have been pivotal in

evolving DOC's understanding that conservation challenges are not solely biophysical issues solvable by technical means. They are complex problems, intertwined with human influence and community dynamics. This holistic view has been instrumental in shaping the Ngā Awa programme, launched in 2019, which focuses on restoring the biodiversity of 14 rivers across New Zealand, from mountains to sea. The programme underscores the importance of collaboration, co-design, and co-leadership with iwi, hapū, and whānau.

- This more holistic view has also influenced internal structuring, particularly highlighting the importance for DOC rangers to establish and maintain positive local relationships, recognising these as key to successful conservation alongside scientific and technical expertise.
- The Living Water work helped raise the profile of DOC obligations and work related to freshwater species and habitat within the Department. This work takes DOC staff and projects beyond Public Conservation Land (PCL), which was not well recognised as “core work” at the time. The visibility of the Living Water partnership (which in itself was challenging given that perceptions of ‘dirty dairying’ were common) and its effort and resourcing invested in “Telling Our Story” helped elevate the profile of freshwater work within DOC at a time when there was very little budget for freshwater work in the department.

3.2.2 Relational changes

Both DOC and Fonterra entered the Living Water Waikato Peat Lakes programme with existing relationships, reputations and profiles within the catchments (and beyond). Throughout the 10 years of the Living Water Waikato Peat Lakes programme, new collaborations and relationships were formed, contributing to longer-term change pathways. Examples include:

- In the Manga-o-tama catchment, the Mana Enhancing Agreement (MEA) formalised relationships between catchment stakeholders, particularly agencies and landowners. It brought together agencies, mana whenua, and landowners, promoting more collaborative and coordinated efforts, as well as providing access to funding and agency support.
- The Manga-o-tama collaboration adopted a more integrated catchment management approach which also supported progress on the long-standing Waipā District Peat Lakes and Wetlands Accord priorities and membership.
- The working relationship between Living Water's DOC staff and Ngāti Apakura has been built over the course of the partnership, increasing both involvement in the lakes and helping to fulfil mana whenua aspirations and values, such as the pā harakeke development. The joint projects involved both planning and hands-on work between Living Water's DOC staff and hapū members over years. Those individual relationships can be comfortably carried into the future by local DOC staff.

3.2.3 Ecological changes and valuing the environment

Supporting (or ‘restoring’) ecological systems to be healthy and resilient takes time, beyond the 10 year timeline of the Living Water programme. Changes that are part of the necessary building blocks towards longer term change, include how we think about the environment, as well as more tangible physical changes. Examples include:

- **Working with mana whenua** has expanded knowledge, understanding and values, as well as priorities and ways of working in a catchment. This included aligning with principles of mātauranga Māori.
- **Increased profile in local communities:** “Ōhaupō welcomes you - Home of the Peat Lakes” signs driven by the Ōhaupō Community Association hoped to raise awareness of the ecosystem restoration work around the Peat Lakes of Ruatuna and Rotomānuka. Local schools have also been involved in planting and educational activities.
- **Engaging people in the environment:** Living Water increased opportunities for people to engage directly in their local environment. Collaborating with Ngāti Apakura, they developed a pa harakeke and rongoā garden to provide resources for local weavers and educational opportunities for schools, which now use the lake and its surroundings as outdoor classrooms. The Good to Grow partnership between DOC and Corrections connected community service workers with their local environment, investing their time in upgrading community facilities and habitat enhancement. Collaborations with surrounding landowners in fencing, planting, bird monitoring and predator control also offered direct engagement opportunities.
- **Wildlife habitat restoration:** Significant effort went into achieving reliable quick-wins in the catchments, such as increasing native plant density, establishing predator trap networks, controlling pest plants, and reducing or eliminating stock access to waterways and seepage areas. These efforts targeted both the wider lake esplanades and obvious waterways, as well as farm areas, guided through FEPs and water quality research. This work was supported and implemented by landowners, the community, mana whenua, specialised contractors, the Good to Grow partnership, volunteers (including schools), lake-users and councils. Volunteers and landowners continue to support efforts to control pest plants, establish riparian vegetation and check predator traps past the life of the Living Water partnership.
- **Remnant Kahikatea stands:** A number of landowners in the Manga-o-tama catchment have protected the kahikatea (trees) from stock by fencing them off and planting underneath.
- **Landowner actions:** Critical source areas for contaminants have been identified in FEPs. These areas have been retired from grazing. New fencing allowed for greater set-back promoting the establishment of riparian plants that filter contaminants. Native plants have been planted, landowners are trapping along the Manga-o-tama wetland network targeting rats and mustelids. Nesting boxes have been installed for ruru (morepork), pekapeka (bats) and wētā. Importantly the FEP process also builds beyond-farm understanding and relationships through its development process, and linkages to the landowner collective (MSWRT). The work done to date represents a significant step towards reducing sediment and nutrient flows into the Manga-o-tama catchment and ultimately the Waipā River.

- **Ruatuna as a showcase site:** Over the last phase of Living Water, Ruatuna has regularly hosted dignitaries such as the Minister of Conservation, Conservation Boards, Conservation Authority, mana whenua representatives, freshwater managers and others. It is also now the regular meeting place for the Waipā Peat Lakes Accord members. As Living Water ends, there is a real challenge for agencies (particularly DOC and the WDC) to maintain the restoration gains made.
- **Manga-o-tama project:** Built on the existing restoration efforts and formalised a co-ordinated catchment management approach in sharing resources, services and funding. Significant funding from WRA, WRC and Living Water towards the restoration work was leveraged through the project.

3.2.4 Capability/capacity changes

During the decade-long Living Water Waikato Peat Lakes programme, there was a noticeable improvement in the capabilities and capacities of various groups and individuals involved.

- The Living Water team, who already had knowledge in ecology, restoration, agriculture (including Fonterra representatives), and freshwater, expanded their collaborative and strategic skills through the project. This enabled them to more effectively plan for and achieve the programme's social and organisational goals. Building strong relationships and partnerships with stakeholders, including farmers, mana whenua, different agencies, and community groups, was a significant advancement, offering promise for future initiatives to protect and enhance freshwater in the Waikato.
- Mutual benefits of the relationships with mana whenua included expanding knowledge, understanding and value, as well as priorities and ways of working.
- Bringing together the Manga-o-tama landowners as part of a larger collaboration has helped develop a deeper understanding of individual farms and their role within the larger catchment. It has also strengthened connections to diverse knowledge and expertise that supports environmental management at the local level, including lessons from Living Water's on-farm trials, access to regional council staff, and freshwater scientists, and collaboration with mana whenua.

3.2.5 Financial investment and impact

Over the past decade, the Waikato Peat Lakes programme has received significant financial investment and has been able to leverage additional resources. Living Water contributed \$3.66 million over ten years. Additional financial support of \$520,000 included \$388,000 from the Waikato River Authority, \$102,000 from Waikato Regional Council, and \$30,000 from Waipā District Council for the Manga-o-tama catchment project. Much of this funding has been spent within the catchment and wider community with landowners investing in support of the project and meeting outcomes. Overall, given the strong social aspect to the programme at the Waikato Peat Lakes site, much of the evidence of investment may not be immediately apparent on the ground, but rather in the long-term outcomes.

3.2.6 Scaling up and out

The Waikato Peat Lakes programme has helped bring together resources from partner organisations and spread important aspects of the project throughout the catchment and beyond. This expansion was made possible by utilising existing resources and fostering collaborative arrangements.

Trials on sediment traps has added to the body knowledge about how and where to place these and key design elements,

Expanding trials and approaches from other Living water sites was instrumental in the design of the Manga-o-tama catchment project and resulted in accelerating engagement and collaboration and effective prioritisation of interventions on farm working with landowners. This increased the efficiency and impact of the overall restoration work. It also aligned well with the priorities of the wider Waipā District Peat Lakes & Wetlands Accord.

In addition to the Waikato Peat Lakes projects, the Living Water partnership, involved in four other national catchments, is integrating the relationships, tools, and methods developed in the Waikato Peat Lakes into their broader organisational strategies. This encourages ongoing collaboration and innovation.



A Ngāti Apakura led trial of a mōkihi, a floating wetland made from raupō and flax flower stalks, supporting several of *Carex* grasses, has generated a lot of interest as a nature-based solution.

4. Insights, challenges, and lessons

Over the last decade, the Living Water Waikato Peat Lakes programme has provided a learning platform for all partners involved. Throughout this period, staff and programme partners have navigated real-world challenges, including unexpected events like cyclones Gita and Gabrielle, to advance the programme's goal of farming and freshwater thriving together. This chapter aims to distil the essence of these collective experiences and focuses on three key areas from the Waikato Peat Lakes programme that highlight the breadth of our learning through these collaborative endeavours.

While this chapter concentrates on three specific areas within the Waikato Peat Lakes programme, it is important to recognise that the insights derived are not confined to this site alone. Many lessons resonate across other Living Water catchments and lessons from evaluations at other sites also inform understanding in this catchment.

The co-benefits, insights, challenges, and lessons arising from the collaborative efforts are explored in the three specific areas. Co-benefits are the additional positive outcomes that emerge from a single programme activity, often extending beyond the primary goal to impact multiple areas. For example, an ecological restoration project might enhance biodiversity while also strengthening community relationships and boosting local economies. Understanding co-benefits helps see the broader impact of the work, emphasising the value of integrating activities across various components of the programme. The insights and lessons derived from this programme are examined, viewing challenges and surprises as catalysts for deeper learning, flexibility and adaptation. This approach honours the diverse contributions of partners and stakeholders, fostering a culture of shared learning and continuous improvement.

This chapter can also serve as a resource for facilitators and catchment communities, providing relevant prompts, insights, and practical guidance to aid future discussions, reflections, and strategic planning.

4.1 Adaptive resourcing

Adaptive resourcing of both social and ecological processes is essential for enduring catchment restoration and resilience. 'Restoration' involves finding a new 'state' that is interconnected with our socio-cultural contexts, rather than returning to a past state. This process is complex, influenced by many socio-ecological factors, and often hindered by a lack of political appetite for risk and uncertainty. As part of the Living Water 'proof of concept' programme, the Waikato Peat Lakes programme provided flexible funding to experiment, learn, seize opportunities, change approaches and priorities and collaborate, free from some of the constraints of business-as-usual practices.

Co-benefits

- **Agility and ability to respond to unintended consequences:** Despite good planning, ‘proof of concept’ projects and innovative trials are often complex and require adaptability. The macrophyte reintroduction trial proved unviable due to uncontrollable reasons (peat-staining affecting light penetration). However, the programme was able to shift its focus to other issues affecting lake quality, particularly the pest plant water primrose which the sediment trap trials had created an ideal habitat for. Effective and cost-efficient control options for these pest plants were uncertain, so the budget was redirected to trial aerial drone herbicide application and aerial mapping of plant coverage.
- **Responsiveness to opportunities for increased impact:** In 2020 Living Water partnered with the Mangaotama Stream and Wetland Restoration Trust (MSWRT), a community-based restoration group formed by catchment landowners. This collaboration facilitated wider dialogue, collaboration and alignment among mana whenua, councils, community groups and other stakeholders. Having flexible funding and experience allowed Living Water to provide financial support and guidance, connecting catchment landowners with information, tools, agencies and funders to enhance their efforts and effectiveness.
- **Flexible roles and leadership:** The ability to respond to changing contexts and opportunities was crucial to Living Water’s work in the Manga-o-tama catchment project. Staff members were able to operate flexibly and adjust their roles, sometimes taking on leadership roles to suit and support the local context.

Insights, challenges, and lessons

- **Integrating monitoring, and particularly evaluation, into practice:** Monitoring and ‘evaluation’ are essential for adaptive management and resourcing. While monitoring is often undertaken, making use of the data for regular reflection, analysis and ‘sense making’ regarding intended outcomes and assumptions, is not common practice, including for Living Water. The challenge is to improve understanding of evaluation practices and incorporate them into routine management processes.
- **Planning and resourcing environmental projects:** Projects often plan ‘technical’ project requirements and neglect to take account of the dynamic social contexts and processes that underpin them. Understanding histories, building relationships, and acknowledging power dynamics need more attention in planning, resourcing and adaptive (project) management. The Waikato Peat Lakes programme had overly optimistic aspirations given its 10-year timeline. Skills to navigate social processes are needed, but can be outsourced if necessary, while also building in-house skills.
- **Organisational culture, skills and ways of working:** Initially, Living Water focused on restoring the lake margins rather than on farm practices. This focus aligned with the traditional work of the Department of Conservation (DOC), which is not surprising considering that DOC staff led the work at place and there was a desire for quick wins. It took time for DOC and Fonterra staff to establish trust, understanding, and the ability to leverage each other’s skill sets. Both organisations’ staff had to learn how

to collaborate, move beyond their respective comfort levels, and shift their focus from 'business as usual'. To promote cross-organisational learning, new approaches and different ways of working, careful planning and facilitation are necessary, with active support from staff managers.

- **Comprehensive planning and sustained progress:** When Living Water began in the Waikato, new funding sources became available. However, few of these could support a complete process that includes planning resources, people, processes, and equipment over the long term needed for significant progress. Although Living Water had 10-year funding, observations within the team are that "things don't go on remote control". Ongoing maintenance costs should be part of project planning. Without this there is a risk of losing the progress made. 'Restoration' is an intergenerational challenge, and programmes/projects need to build wider ownership among stakeholders to continue ongoing restoration and maintenance efforts beyond the expected lifespan of the project.
- **Crossing organisational boundaries and sharing power:** Business-as-usual (BAU) practices often limit who can facilitate certain processes. Facilitating the initial Manga-o-tama catchment collaboration process that connected landowners with agencies and funding, was possible because Living Water had the capability (relationships, skills, knowledge) and freedom (mandate) to take on roles, cross boundaries, and create spaces for others, helping expand landowner efforts, resources and effectiveness. Agencies in particular need to be prepared to share or delegate power. This challenge can be difficult to overcome due to organisational mandates and practices. Flexibility is important for innovation, along with transparency, clear communication, timing and adaptability.
- **Funding experimental and uncertain projects:** The Waikato Peat Lakes need numerous interventions from different stakeholders due to their complexity and the uncertainty of outcomes. Finding funding for experimental projects is challenging but necessary, as current practices are not achieving the needed changes.

4.2 Integrating mātauranga Māori

'Integrating' mātauranga Māori into a programme can be complex and requires a tailored approach. The approach of the Waikato Peat Lakes programme's evolved over 10 years as priorities shifted, staff capability grew, relationships and trust were established, and some shared goals and on-the-ground projects were realised.

Co-benefits

- **Expanding networks and impact:** The relationships built with mana whenua have broader application and, in some cases, can be transferred to other projects and collaborations. Initially focused on individual peat lakes within the takiwā of Ngāti Apakura's (territory), the project's natural progression towards a more comprehensive, catchment scale approach created further opportunities to work with Ngāti Apakura, particularly in the Manga-o-tama initiative. Living Water's flexibility and ability to seize

opportunities have enabled initiatives including land acquisition at Ngāroto/Wairoto and the Rotopiko pest free sanctuary where Ngā Iwi Tōpū O Waipā are strongly represented.

- **Building in continuity:** Current operational systems often treat environmental restoration as isolated projects, with funding eventually coming to an end. However ‘restoration’ is an ongoing process and is never truly completed. Working with mana whenua, who have kaitiaki responsibilities regardless of funding and are deeply connected to their whenua (land), ensures that visions can be maintained and adapted, even as circumstances change. Such partnerships help bridge the gap between project timelines and policy changes and the perpetual nature of restoration, promoting resilience and continuity in efforts.

Insights, challenges, and lessons

- **Work programme development and cultural competency:** Initially, the Waikato Peat Lakes programme lacked the capability and capacity to engage with mana whenua directly. As a result, the first phase of engagement and ‘Māori workstream’ development was outsourced to an organisation with the cultural capability and existing relationships. This outsourcing hindered the relationship between mana whenua and Living Water staff who were not involved in the initial planning work with mana whenua. If Living Water staff had been involved from the start, it could have helped the development of a shared understanding and expectations.
- **Knowledge exchange:** Sharing knowledge can be expanded and built on. For instance, the floating wetland trial, where Ngāti Apakura representatives constructed a floating structure using wetland resources instead of the plastic structures previously tested by Living Water. This concept not only helped establish *Carex* in water, but also generated interest in its biodegradability and the integration of mātauranga Māori into freshwater restoration. This innovation has now been widely shared and there is further interest from Ngāti Apakura representatives to repeat and expand the trial.
- **Building relationships through action:** After the strategic reset, Living Water narrowed its focus to the Lake Ruatuna catchment and partnered with Ngāti Apakura. Collaborative action, such as the pā harakeke project and rongoā garden, helped strengthen the relationships. The practical, action-focussed collaboration increased the pace and results of the progress made in the relationship. Key factors that facilitated this collaboration included expertise, cultural competency, flexible resourcing, and understanding social-cultural contexts.
- **Maintaining links with key people:** Staff turnover and changing priorities can disrupt project continuity. To address this challenge, establishing multiple linkage points with groups and addressing resourcing and equity issues is essential. Living Water faced difficulties with changing points of contact within mana whenua and Living Water staff, while an ‘outsourced’ contractor was the only one providing continuity. In addition, collaboration opportunities increased through connections with Ngā Iwi Tōpū o Waipā via other projects like the Peat Lakes Accord.

- **Expectations of mana whenua:** Integrating mātauranga Māori into projects was a core principle of the Living Water partnership. However, this assumed that mana whenua would have the time, resources and willingness to be directly involved in project planning and implementation. For mana whenua, this work was (and generally still is) underfunded and has to be fitted in around other existing obligations. The insight is that flexible budgets and support are crucial for true representation of key partners, acknowledging their value to the project. The challenge lies in aligning expectations and resources, and the lesson is not to presume or expect not to presume or expect mana whenua will always want to (or be able to) be will always want to (or be able to) be involved.
- **Understanding socio-cultural contexts:** The Waikato region holds significant national historical importance, especially regarding the Land Wars and resulting land confiscations that continue to have an impact. Understanding social and cultural histories as well as current contexts, along with ecological and hydrological systems, provides essential “baseline” information that can enhance engagement with mana whenua (and communities in general) for programme development and implementation. The insight is that a deep understanding of socio-cultural contexts is fundamental in understanding ‘catchments’ and the wider systems they exist in.

4.3 Stronger relationships to increase resilience and impact

The collaboration journey in the Waikato Peat Lakes programme showed the importance of strong relationship networks for project resilience and impact. Initial work focused primarily on DOC interests, but over time DOC and Fonterra developed a strong working relationship that encouraged staff to move beyond their usual roles. Relationships also expanded through collaboration with Ngāti Apakura and local landowner-led groups, extending catchment efforts beyond Living Water.

Co-benefits

- **Diversifying knowledge and capacity:** Investing time and resources to work closely with project partners helped build and strengthen relationships crucial to the programme’s success. This commitment also provided opportunities to diversify knowledge in the many different aspects of catchment restoration, linking landowners with restoration experts. Close collaboration across partners and stakeholders in the Manga-o-tama catchment initiative increased the capacity of Living Water to contribute to large scale restoration initiatives. Living Water’s investment into the Manga-o-tama catchment also benefited Waipā District Council and Waikato Regional Council, increasing their delivery capacity.
- **Flexibility and responsiveness:** Being able to adapt and respond to changing contexts and partner priorities helps maintain project momentum, keep partners and stakeholders engaged, and can help ensure efficiency and effectiveness. The Living Water team demonstrated this in the Manga-o-tama catchment restoration initiative by leading initial conversations and securing funding. The MSWRT had willing

landowners and had already initiated some restoration work, while WRC had funding and aspirations for the catchment. This flexibility led to the Manga-o-tama, Ōhaupō Peat Lakes to Waipā River: Catchment Restoration Project.

- **Relationship resilience:** Building trusted relationships with multiple connection points strengthens resilience to personnel changes, organisational buy-in, and commitment (and funding) fluctuations. The wide range of partners involved in the Manga-o-tama, Ōhaupō Peat Lakes to Waipā River: Catchment Restoration Project, along with diverse funding sources, should help the project's resilience, with multiple points of contact and organisational buy-in, strengthened through the MEA.

Insights, challenges, and lessons

- **People continuity:** During the 10 year Waikato Peat Lakes programme, personnel changes at Living Water created challenges in rebuilding organisational relationships, impacting on project timelines and outcomes. Maintaining multiple connections with an agency can help mitigate these impacts. Project handovers with clear actions and timelines for transitioning relationships can also be beneficial.
- **Practical tools build credibility and landowner buy-in:** Providing landowners with practical tools can help build credibility and engagement. Developing targeted FEPs and using catchment prioritisation tools and data informed landowners' decision-making on the most effective on-farm interventions. Contaminant reduction, particularly on-farm sediment traps, generated interest from landowners, elevating the Living Water programme beyond a standard planting initiative.
- **Working with willing participants to access others:** Starting with willing participants helps establish credibility and a reputation for responsiveness and effectiveness. This approach was successful in the Manga-o-tama catchment initiatives, and at the Pūkorokoro-Miranda Living Water site, where the reputation spread through local networks.
- **Relationships and knowledge for impact:** Building relationships and knowledge are crucial for achieving significant resource investment and practice changes both on and off-farm. Reducing contaminant loads requires on-farm work, which often involves compromises for the landowner such as retiring land from grazing. Building good relationships based on trust, supported by reputable experts and experience is essential. The Manga-o-tama project required tried and tested interventions to gain confidence for subsequent actions.
- **Building on existing efforts and collaborations:** Connecting with the landowner-led Mangaotama Stream and Wetland Restoration Trust and helping them access funding for guidance and initiatives facilitated a smooth start for the catchment restoration project. Collaborating with councils on small steps contributed to the priorities in the Waipā Peat Lakes Accord, and strengthened relationships within the catchment.

- **Local ownership and values:** Fostering local ownership of shared outcomes, rather than just involvement in activities, is crucial. Agency personnel may change, but those grounded in the local area, such as mana whenua or landowners, remain constant. Catchment restoration should consider local factors (such as personnel and history) to build resilience and maintain engagement. Living Water gained this insight through the Manga-o-tama catchment work and the development of the pā harakeke with Ngāti Apakura.

Collectively, these and other evaluation reflections on collaborative initiatives from the other Living Water sites, can lay the groundwork for future planning. They aim to sustain the positive impacts of this work, providing guidance for future environmental stewardship and community engagement. The potential of these insights to reach a broader audience underscores the hope that the experiences and lessons detailed here will inspire and support similar efforts elsewhere, fostering a culture of collaboration, sustainability, and resilience. Presenting these areas as prompts for facilitated discussions raises the possibility that the evaluation will serve as a living document, guiding and informing ongoing and future initiatives.



The Ōhaupō community adopted the peat lakes as their town identity, with large billboards at town entry points and bus stops decorated with murals of wetland birds.

5. Progress assessment and recommendations

This concluding chapter synthesises the diverse experiences and outcomes of the decade-long Waikato Peat Lakes site programme, which aimed to restore peat lake ecosystems. Here, we critically evaluate the programme's alignment with its evolving Theory of Change over the past decade, assess the efficacy of its underlying assumptions, and revisit the guiding principles of the Living Water initiative. This reflection highlights achievements and challenges, and provides recommendations for future environmental management initiatives. These insights aim to reflect on the journey of the Waikato Peat Lakes programme, and contribute to discussions on sustainable catchment management and other working 'at place' initiatives, both locally and beyond.

5.1 Programme achievements and outcomes

The Waikato Peat Lakes site focused on improving water quality and restoring unique peat lake ecosystems. Initial work centred on scientific understanding of the lake systems, 'quick win' restoration work (like planting), and initiating relationships with mana whenua. Over ten years the strategy evolved, narrowing focus to Lake Ruatuna, before broadening into a catchment-scale initiative in collaboration with partners and landowners. At the five-year mark, a strategic reset refined the focus to achievable goals and transitioned from a catchment restoration to a proof of concept. The programme's Theory of Change and logic model were updated to include social and cultural changes necessary for balancing farming and freshwater, guiding the programme's monitoring and evaluation.

This section outlines how the Waikato Peat Lakes programme has met the planned activities and outputs, and assesses its contribution to the outlined outcomes. The subsequent discussion will examine these achievements considering the evaluative evidence gathered across the programme's lifecycle, aiming to provide a balanced view of both the accomplishments and areas where expectations have not been fully realised.

5.1.1 Achievement of activities and outputs

With a view to identifying tools and approaches to improve water quality both in-lake and around the lake, multiple projects were trialled and case studies written up and shared on the Living Water website and social media platforms. These case studies provide details on the purpose, use, results, lessons learned, and links to further information. The transparency and sharing of trial results, even those with varying levels of 'success' is commendable, and aligns with the programme's 'proof of concept' approach and 'Telling our Story' strategy.

The programme made efforts to engage broadly with Waikato peat lakes communities. This involved building relationships with a cross section of representatives from different parts of the community with a particular focus on shared predator and pest plant control efforts. Local schools were also involved in programme activities such as planting, the pā harakeke

and guided wetland education activities. Work was done around Lake Ruatuna to improve the amenity block and surrounding areas, with the assistance of Department of Corrections community service workers.

With the revised focus on Lake Ruatuna, there was hope that reintroducing aquatic macrophytes could be a ‘game changer’ for addressing nutrient and sediment levels, as well as other peat lakes. However, research commissioned for this purpose ruled out this approach as viable. Although this was disappointing, the initial research findings and lessons have been shared.

Expanding on the collaboration of a small group of landowners in the Manga-o-tama catchment, the programme connected them with other organisations and secured additional funding, boosting resources and reach into the catchment. This accelerated completion of farm environment plans (FEPs) for most Fonterra farms in the catchment, along with expansion of fencing and planting work, implementation of interventions to reduce contaminants and the installation of real time water quality monitoring devices.

5.1.2 Contribution towards outcomes

At the beginning of the programme, many stakeholders may have expected to see evidence of new farming practices being adopted at the catchment scale and improved water quality within the 10-year lifespan of the programme. However, improving catchment management practices and water quality is a complex issue that takes time, with a significant lag between implementing new or improved practices and seeing results. Achieving lasting change in these areas requires a combination of coordinated organisational strategies and sustainable farmer practices, along with substantial funding and time investment.

As demonstrated in the Living Water programme, it can also involve trial and error, be influenced by environmental factors (like droughts and floods), and depend on the ability to seize opportunities. Moreover, it is as much a social venture as it is an environmental one, involving the building of trust, fostering collaboration, and developing shared goals over time. This complexity emphasises the need for realistic expectations. This includes understanding that measurable improvements in water quality and farming practices may take longer than the programme’s duration, recognizing the need for ongoing adaptation and learning, and valuing incremental progress. By focusing on intermediate steps, like building relationships and collaborations, implementing pilot projects, and sharing lessons learned, stakeholders can pave the way for longer-term success.

The impact of the Waikato Peat Lakes programme extended beyond immediate outputs, contributing to both anticipated and unforeseen outcomes. As detailed in Chapter 3, the project resulted in positive changes in relationships and environmental outcomes. For example, work in the Manga-o-tama catchment was formalised through a Mana Enhancing Agreement, establishing a range of relationships between catchment landowners, mana whenua, councils, and other agencies. It has also led to actions aimed at improving water quality, such as retiring land from grazing and planting riparian zones, as well as enhancing biodiversity. More than 200,000 plants have been planted in the three peat lake

catchments through the combined efforts of landowners, schools, contractors, mana whenua, community service workers and other volunteers.

The programme also contributed to organisational and relational changes, with Living Water being recognised for its role in shifting ‘business as usual’ practices within Fonterra and the Department of Conservation (DOC). These changes include integrating biodiversity into Fonterra’s farm environment plans and enhancing DOC’s efforts in freshwater conservation.

5.1.3 Areas for improvement

The Waikato Peat Lakes programme, while achieving successes, encountered challenges that offer valuable lessons for future environmental management efforts. Reflecting on these experiences is crucial for acknowledging the complexities of such ambitious projects and for identifying pathways to enhance their effectiveness and sustainability.

Building working relationships takes time, especially between two large organisations with different missions, responsibilities and ways of working. The Waikato Peat Lakes site, like all Living Water sites, began with ambitious outcomes to be achieved in a relatively short period of time and with limited resources considering the timescale and complexity of ecosystem change required.

The early work programme involved familiar activities for the DOC-based site team, while the role of Fonterra was less clear, as only a few farms surrounded the three lakes initially focussed on. Investing more effort in this early phase to build better mutual understanding and buy-in to the partnership at a regional and local level could have helped Fonterra staff integrate their work into the programme at an earlier stage. Recognising the time it takes to build working relationships should also be considered in project plans (and budgets).

Discussions with mana whenua in the initial three lake catchments began after the programme had started work, facilitated by a consultant. These factors limited the strength of relationships with mana whenua and the ability to understand and incorporate their aspirations and priorities into programme planning. By the time the mana whenua plan had been developed, the strategic reset had revised the programme’s focus, undermining some of the planning work done with mana whenua. While work with Ngāti Apakura took place (pā harakeke, rongoā garden and mōkihi floating wetland), planning work with Lake Areare mana whenua could not be continued in the Living Water programme due to limitations in capacity and resources. Early and extended engagement, along with in-house cultural capability could have helped build a shared realistic work programme and budget, including better resourcing of mana whenua for their time and expertise.

Developing and maintaining a stronger working relationship with the Waikato Regional Council could have also helped strengthen the capability and capacity of the Waikato Peat Lakes site team through catchment officers and funding for landowner initiatives such as land retirement.

Resource constraints (capability, capacity and funding) also posed significant challenges, limiting the scope and reach of key activities, particularly in habitat restoration and the

development of key relationships. The programme's goals had to be balanced against the available funding and human resources, emphasising the need for enhanced resource allocation. While diversifying funding streams is a recommended strategy, it is acknowledged that this is particularly challenging, especially now that the programme has concluded. Emphasising realistic and sustainable funding models will be crucial for ensuring both financial stability and operational support in future initiatives.

5.1.4 Contribution to unplanned outcomes

The Waikato Peat Lakes programme had unexpected outcomes focussed in and around Lake Ruatuna's catchment. As mentioned in Chapter 4, the programme's flexibility, experience, responsiveness, and networks, helped secure external funding for Manga-o-tama catchment landowners. This effort built upon landowner initiatives to reduce water quality impacts, and brought together mana whenua partners, WRC, WDC and NZ Landcare Trust to scale up catchment restoration activities.

By focusing on the broader catchment and fostering collaboration, the programme contributed to the long-standing Waipā District Peat Lakes Accord. This led to new funding initiatives, aligned stakeholders and more regular meetings and engagement.

The situation around Lake Ruatuna margins highlights the need to maintain gains and plan for longer project terms and transitions. Previously a 'showcase' for targeted wetland restoration, the area now struggles with pest plants, both on land and in the water. The ability to maintain restoration gains during and after Living Water was heavily influenced by maintenance funding availability.

Engaging with schools and community groups resulted in the Ōhaupō community adopting 'Home of the Peat Lakes' as part of their town's identity. Wetland biodiversity signage and murals were created throughout the town. Several schools also participated in large-scale farm planting through the Manga-o-tama work, further connecting them to wetlands and the value of whole catchment restoration.

Reflecting the 'knowledge exchange' that took place, Ngāti Apakura developed an all-organic floating wetland, using material sourced from the wetland. A traditional mōkihi (raft) replaced the typical plastic structure. This innovation has been shared with other iwi, through media channels, word of mouth, and at wānanga and conferences, generating interest for its ingenuity, integration of mātauranga Māori and biodegradability.

5.1.5 Reflecting on guiding principles and assumptions

Living Water’s national guiding principles and assumptions played a crucial role in shaping the direction and outcomes of the Waikato Peat Lakes programme. Collaboration, integration of mātauranga Māori, and creating connections were important drivers in the early stages. These principles recognised the importance of building relationships and working together to bring about change in the catchment. The trialled tools aimed to assess their effectiveness at specific sites, their potential for scalability to other catchments, with an emphasis on adaptability, monitoring, user appeal and cost effectiveness. Notable case studies were shared through social media and the Living Water website, showcasing the programme’s emphasis on learning and sharing, as outlined in the programme’s ‘telling our story’ strategy.

The four causal assumptions formalised in the programme’s 2018 theory of change (see Chapter 1.4) - related to partnerships, social learning, behaviour change and systems thinking overlap effectively and reflect the complexity of the work. Multiple elements and influences within the system (including organisational, wider communities, policy, etc.) needed to undergo changes to enable and reinforce the desired transformation. In the Waikato Peat Lakes, this more systemic approach becomes apparent in the programme’s final stage, particularly with the work in the Manga-o-tama catchment.

Evaluating these principles and assumptions, and considering the programme’s achievements and challenges as discussed throughout this report, demonstrates an alignment between the programme’s strategic intent and its operational execution. This reflection not only validates the underlying theoretical framework and also highlights areas for improvement, ensuring that future initiatives can build upon this foundation with enhanced strategies and clearer objectives.



Lake edge sediment traps were trialled to capture contaminants before they enter Lake Ruatuna.

5.2 General recommendations

Reflecting on the journey of the Waikato Peat Lakes programme highlights the value of collaboration and adaptive management in progressing environmental aspirations in complex place-based initiatives. While acknowledging achievements, this analysis also identifies areas for improvement and the emergence of unexpected outcomes. These experiences provide important lessons for partners and stakeholders of the Living Water programme.

To aid the success of future environmental projects, it is essential to learn from both the challenges faced and the unexpected successes encountered. By adapting strategies based on these experiences, seizing new opportunities as they arise, and committing to continuous learning, future initiatives can better support comprehensive processes of change. This approach aims to enhance environmental management efforts, making them more effective and inclusive, and ultimately benefiting both communities and natural environments.

While the Living Water partnership concludes its decade-long programme, the work of catchment and other place-based management initiatives continues. Therefore, the following recommendations are intended for organisations, mana whenua, and communities engaged in ongoing catchment stewardship. They emphasise the importance of often-overlooked intermediate results or “supporting structures” essential for advancing long-term environmental and social goals:

- **Be flexible beyond ‘business as usual’:** BAU practices can hinder innovation and momentum, reinforcing siloed thinking and approaches. In wetland restoration for example, there is no single activity that can solve all problems. It is therefore crucial to utilise a variety of approaches that build on existing knowledge, while also allowing for experimentation and research. Future collaborative initiatives should adopt a holistic and flexible approach to roles and leadership, working with a diverse range of partners.
- **Strengthen inter-agency collaborations’ linkages with mana whenua and local landowners:** Ensure that linkages and opportunities for knowledge sharing are built on and maintained between catchment landowners, mana whenua and inter-agency collaborations (such as the Accords). These linkages should inform strategies and implementation actions, generating greater buy-in for change initiatives.
- **Support the implementation of Farm Environment Plans:** FEP processes can increase awareness and understanding of the impacts of both on-farm and wider catchment management practices. However, they are not a complete ‘solution’. It is important to follow-up with landowners/managers to provide support for FEP implementation, including through farming industry organisations such as Fonterra, to ensure motivation and momentum continues.

- **Ensure mana whenua are engaged early, resourced and part of decision-making:** Prioritise early engagement with mana whenua, building relationships, and understanding of their contexts, aspirations, interests and capacity. Agencies and inter-agency collaborations should be more willing to share decision-making, address power inequities, adapt ways of working, and contribute resources.
- **Practise patience:** Agencies and organisations need to recognise (and allocate resources for) the time required to build and maintain relationships, gain momentum, and consider wider contexts. These contexts may include competing priorities, lack of funding, time constraints, and weather conditions that can influence engagement and action, especially for landowners and mana whenua. Demonstrating patience and understanding reduces the risk of losing people’s support, shows respect for the value they bring, and signifies a commitment to genuine collaboration. Recognise and embrace the natural ebb and flow of the initiative.
- **Build upon the scope and value that monitoring can provide:** Enhance existing monitoring practices by connecting them to a broader Theory of Change. Incorporate regular evaluation practices that encourage teams to think collectively and holistically, taking into account social, cultural, economic and environmental contexts. This approach will help identify successes, issues and opportunities, which can then inform more responsive and adaptive planning and decision-making.

These recommendations are based on the insights, challenges and practical experiences from the Waikato Peat Lakes programme, contributing to the advancement of inclusive, adaptive, and resilient management practices. Together with other evaluation reflections from collaborative initiatives at the other Living Water sites, these recommendations lay the groundwork for future planning. We envisage these recommendations serving as actionable guides for practitioners, ensuring that the evaluation remains a dynamic resource for ongoing and future efforts.

Appendix I: Information sources for evaluation

The development of this evaluation report is grounded in a participatory model that prioritises collaboration and inclusive engagement across a wide array of stakeholders. The approach has integrated insights and contributions from various partners, enriching understanding of the outcomes and impacts of the Living Water initiatives. Presented below is an outline of the key information sources and participatory processes that have informed the evaluation.

Waikato Peat Lakes site specific sources

- Living Water Evaluation Team: Developed in close collaboration with an evaluation team comprising 7 members (See Appendix II). The team comprised two independent evaluation consultants, and included site-specific staff and national programme staff from both Fonterra and the Department of Conservation (DOC).
- Two individual interviews with programme participants.
- Living Water webpages: [Lakes Areare, Ruatuna, Rotomānuka/Ngā roto o Areare, o Ruatuna, o Rotomānuka](#) served as a primary source of both current and archived information on site objectives, activities, and outcomes. Webpage project summaries include:
 1. [Macrophyte Reintroduction Trial](#)
 2. [Waikato Lake Edge Sediment Traps Trial](#)
 3. [Pinpointing catchment contaminant loads - Lake Ruatuna](#)
 4. [Manga-o-tama Catchment project](#)
 5. [Real time water quality monitoring](#)
 6. [Wildlife habitat restoration](#)
 7. [Pā Harakeke](#)
 8. [Floating Wetlands Trial](#)
 9. [Hydroseeding Trial](#)
 10. [Water Primrose \(*Ludwigia*\) Control](#)
 11. [Use of eDNA to detect species at Waikato Peat Lakes](#)
 12. [Koi Carp Barrier at Lake Ruatuna](#)
- Waikato Peat Lakes monitoring data - from national Living Water site monitoring data (unpublished).
- Living Water Programme Annual Reports 2014 - 2023, see [our-progress](#).
- Living Water Waikato Iwi Long Term Plan: Ngāti Apakura, Ngāti Mahuta and Ngāti Wairere (unpublished).

Wider Living Water evaluation activities

1. Evaluation design and ethics

- Development of [Living Water National Planning, Monitoring & Evaluation Framework](#) (July 2017-2018).
- Development of Waikato Peat Lakes [Site Logic Model](#), indicators and monitoring plan
- An evaluation ethics plan was developed with the Living Water management team and agreed with the Senior Responsible Owners for the Living Water Partnership from the Department of Conservation and Fonterra. Those involved in the Living Water programme evaluation followed the agreed processes and complied with the ethics protocol.
- The independent evaluation consultants were responsible for undertaking individual and group interviews to assure participant confidentiality and anonymity.
- Development of Performance Story and CAME evaluation methodologies underpinning final individual site evaluation reports. This evaluation design was developed by the independent consultants, and then fine-tuned in consultation with each site Evaluation Team.
- Cross-site Learning: The evaluation methodology was significantly enriched by learnings from across all the Living Water sites. This broader perspective was crucial in shaping insights and understanding of each site's unique challenges and successes, fostering a comprehensive understanding that reflects the interconnectedness of the Living Water initiatives.
- Development and implementation of the Whakamana te Waituna Monitoring & Evaluation Framework, Programme & Action Plan in 2019.
- Two participatory partnership evaluations for Living Water management and governance groups (2018 and 2021).
- Waima Waitai Waiora (Wairua) Mana Enhancing Partnership review (March 2022).
- National evaluation reflection with Living Water team (December 2022).

2. Interviews with past and present staff

- Conducted one-on-one interviews with past Living Water staff across 3 sites, gaining historical perspectives and insights into the evolution of programme activities and strategies.

3. Engagement with representatives outside the Living Water Partnership

- At certain sites, we engaged with 1 or 2 representatives from other partner organisations, broadening our perspective on collaborative efforts and their impacts

4. Regular meetings with programme management

- Fortnightly meetings with two members of the Living Water programme management team were instrumental in aligning the evaluation process with the programme's overarching goals and objectives. These two members were also involved as members of the site evaluation teams (See Appendix II)

5. Annual Living Water hui and reflections

- Including a final closure hui and field trip held with both Living Water staff and stakeholders and presentations and field trip for NZARM conference (November 2023).

6. Living Water Site Evaluation Reports

The development of these reports provided detailed insights into the specific activities, outcomes, and lessons learned at each site, contributing to a nuanced understanding of local and site-specific contexts.

- Wairua River Evaluation Report
- Pūkorokoro-Miranda Evaluation Report
- Waikato Peat Lakes Evaluation Report
- Ararira LII Evaluation Report
- Whakamana te Waituna Evaluation Report¹
- Site reports found on the [Living Water website](#)

7. Living Water National Evaluation Summary

A national evaluation summary provides an overview of the achievements and outcomes of the Living Water partnership and draws together the lessons and recommendations from the five site evaluation reports.

- Report can be found on the [Living Water website](#)

8. Place-based Engagement and Impact tool

The Place-based Engagement and Impact tool was created to aid organisation staff and stakeholders in place-based initiatives. It provides flexible guidelines for implementing complex environmental and community programmes.

- The tool can be found on the [Living Water website](#)

1. The Whakamana te Waituna Evaluation Report was commissioned by the Whakamana te Waituna Trust, of which Living Water was a key member and funder.

9. General documentary and secondary sources

- [Living Water programme](#) website: Served as a primary source of both current and archived information on programme objectives, activities, and outcomes
- [Living Water \(2018, updated 2020\) National Planning, Monitoring & Evaluation Framework](#)
- Living Water [Governance and Operating model](#)
- [Living Water Story \(ebook\)](#): A celebration and summary of experiences and learnings from all five sites offered a holistic view of the programme's objectives and achievements
- **General material:** Reviewed additional materials of a more popular nature, including newsletters, media releases, and public communications. These sources helped capture the broader narrative and public engagement strategies of the Living Water initiative
 - External online information sources:
 - Mangaotama catchment group website - [Mangaotama Catchment](#)
 - New Zealand History, The Treaty in Practice [The Waikato-Tainui claim | NZ History](#)
 - NZ Landcare Trust, [Rotomānuka Lakes Project](#)
 - Te Waka, Waikato Economic Development, [Regional Economic Data & Insights](#)
 - Waikato River Authority, [Waikato River Authority](#)
 - Waikato-Tainui iwi website, Settlements
<https://waikatotainui.com/about-us/settlements/>

This multifaceted approach to gathering information has enabled a comprehensive and nuanced evaluation of the Living Water initiatives across the sites. It reflects our commitment to a participatory and inclusive methodology, ensuring that the insights and learnings derived from this evaluation are deeply informed by the experiences and expertise of all stakeholders involved.

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Appendix II: Author biographies

External evaluation consultants

Will Allen

Consultant Evaluator

Dr Will Allen is an independent evaluator and systems scientist with over 30 years of experience in sustainable development and resource management. His work bridges local, indigenous, and organisational perspectives, helping multi-stakeholder groups develop shared goals, actions, and indicators. An inaugural Board member of the Aotearoa New Zealand Evaluation Association (ANZEA), he has managed the Learning for Sustainability (LfS) website since 2006. The site is a knowledge hub for methodologies, skills and processes needed to support collaboration and address complex sustainability issues.

Viv Sherwood

Consultant Evaluator

Viv Sherwood (VM Works) is an independent consultant with almost 20 years' experience in government sector operational roles in community development and environment sectors. Viv has also worked with and within iwi structures on environmental management. Her monitoring and evaluation work is informed by practical experience - in operational planning and delivery, the complexity of working in partnerships, as well as community development approaches - with participatory and complexity-aware monitoring and evaluation (CAME) approaches preferred.

Living Water Ararira LII Evaluation Team

Sarah Yarrow

Living Water National Manager

Sarah Yarrow managed the national Living Water programme, bringing together a diverse range of stakeholders to enhance freshwater ecosystems while supporting sustainable agriculture. Her leadership and strategic vision have been instrumental in guiding the programme's development and implementation across multiple catchments.

Katie Collins

DOC Freshwater Science Lead

Dr Katie Collins was the Principal Scientist for the Living Water programme, providing scientific guidance and expertise to ensure the programme's activities are grounded in robust evidence and best practices. Her work involved close collaboration with site leads, researchers, practitioners, and community members to drive impactful environmental outcomes.

Dion Patterson

DOC Site Lead

Dion Patterson was a Site Lead with the Department of Conservation (DOC) at the Waikato Peat Lakes site. His role involved guiding the direction of the programme's initiatives, engaging with stakeholders, and coordinating efforts to restore and protect the catchment.

Rose Graham

DOC Site Lead Support Ranger

Rose Graham served as a Site Lead Support Ranger for DOC, helping to implement freshwater initiatives at the Waikato Peat Lakes site. Through the programme, she has gained extensive experience in managing and delivering conservation projects and fostering community partnerships.

Tracie Dean-Speirs

Fonterra Senior Partnerships Manager

Tracie Dean-Speirs was involved in the initial establishment of the Living Water programme and selection of sites as a Lakes Management Advisor at Waikato Regional Council, and then as a member of the Freshwater Science team at DOC. Tracie moved to Fonterra in 2021 to run the Fonterra Sustainable Catchments Programme for the North Island and has provided invaluable advice and expertise into the Living Water programme.