

# Okarika Pocket Catchment

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## Catchment Condition Survey Report

February 2018



## **Okarika Pocket Catchment - Catchment Condition Survey Report February 2018**

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### **Reference:**

Natural Solutions Contract Report 18/159

### **Acknowledgements:**

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### **Disclaimer:**

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# 1. Introduction

Living Water is a partnership programme between the Department of Conservation (DoC) and Fonterra helping local communities, dairy farmers, iwi/hapū and other stakeholders to improve water quality and biodiversity values to demonstrate sustainable dairy farming.

Okarika catchment is one of five significant water catchments across New Zealand where Living Water demonstration projects are being undertaken. Okarika is a sub-catchment pocket encompassing 5,220 hectares of dairy and drystock farmland and lifestyle blocks in the greater Hikurangi swamp basin. The waterways are part of a flood protection scheme that flow into the Wairua River.

A field survey was undertaken to capture a snapshot of the catchment condition based principally around an assessment of stock access to waterways, riparian vegetation, but also soil erosion, stream structures, and significant natural features in the catchment.

The results of the catchment condition survey will help highlight opportunities to address key water quality and ecological issues in the catchment. This will enable the Living Water project team to work with the local community to identify management activities in priority areas. The survey results also provide a baseline monitoring dataset to track the change in catchment condition over time.

The project brief for the Okarika catchment condition survey was to:

- 1) Contact landowners and ask permission for access to their properties for the survey.
- 2) Complete the catchment field survey.
- 3) Provide the GIS data, a summary map and a summary report.
- 4) Present the results to Living Water staff.

## 2. Method

### 2.1. Survey criteria

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The method for this survey followed closely the method undertaken in the survey of the Pūkoro-Miranda catchment undertaken by Natural Solutions for Living Water in 2017 (Kendal, 2017). The survey brief was to capture riparian data for all the Hydro\_50k identified streams, and other waterways that were considered significant while undertaking the field survey.

The primary features assessed for this survey were:

- stock access to waterways;
- riparian vegetation type;
- stock access to significant natural features; and
- land/riparian erosion.

As a secondary focus, these features were recorded during the survey where encountered:

- stream structures;
- stream blockages;
- weed issues;
- threatened species presence; and
- any relevant landowner comments.

### 2.2. GIS setup

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DoC provided the following features for the GIS mapping setup:

- Okarika Pocket catchment polygon as the survey boundary
- Landowner information for each property

The following datasets provided the base features for the survey:

- NZ primary land parcels (LINZ)
- NZ river centrelines (Hydro-50k) (LINZ)
- 2012 Land cover database (LCDB v4.1) (LRIS)

Table 1 lists the property dataset and Table 2 lists the catchment features captured. These features were set up in ArcGIS Online and updated directly from Arc Collector apps on digital field devices into the online geodatabase. The drop-down menu options for each feature are listed in the tables. There was also an option to include notes and photos with each feature.

Riparian vegetation types were surveyed in the field as either 'native', 'grass' or 'exotic' depending on which was most dominant vegetation in the 5m riparian edge along a length of waterway.

The LCDB layer was utilised to provide existing polygons for natural features to be ground-truthed in the field. Before the survey, these polygon shapes were adjusted to the latest satellite imagery to minimise adjustments necessary in the field.

**Table 1: Property data fields of interest**

Property surveyed?	polygon	Need to contact owner
		No contact details yet
		Permission granted to access
		Access permission denied
		DO NOT access site or collect information
		Survey complete (onsite)
		Survey complete (offsite)
Owner	polygon	[notes only]
Occupier	polygon	[notes only]
Notes	polygon	[notes only]
Phone number	polygon	[notes only]
Health and Safety	polygon	[notes only]

**Table 2: Features collected in the field survey**

Feature	GIS shape	Drop-down menu options
Riparian stock access	line	No access (fenced) TL only
		No access (fenced) TR only
		No access (fenced) BOTH sides
		Access both sides
Riparian vegetation	line	Exotic both sides
		Native both sides
		Grass both sides
		Exotic TL, Native TR
		Native TL, Exotic TR,
		Grass TL, Exotic TR
		Grass TL, Native TR
		Exotic TL, Grass TR
		Native TL, Grass TR
Riparian erosion	line	[notes only]
Potential fish barriers	point	Culvert
		Crossing – ford
		Crossing – bridge
		Infilling of floodplain
		Weir
		Bund or stopbank

Stream blockage	point	Vegetation
		Gravel
Land erosion	polygon	Gully/tunnel
		Stream bank
		Sheet/rill/pugging
		Harbour edge
		Mass movement: slips/slumps
Significant natural features	polygon	Broadleaved indigenous hardwoods (forest)
		Indigenous forest (forest)
		Manuka and/or kanuka (forest)
		Flaxland (wetland)
		Herbaceous freshwater wetland (wetland)
Natural feature stock access	polygon	Stock have access
		Stock have no access
Weeds	point	[notes only]
Threatened species	point	Animal
		Plant

\*TR/TL = true right/left bank of stream (when facing downstream)

## 2.3. Landowner approach

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The landowners in the Okarika catchment had been made aware of the Living Water project by personal visit or letter (Appendix A). The letter explains the catchment condition survey and asks permission for Natural Solutions to access private land where required for the field survey.

Landowners were phoned to request access for the assessment. DoC provided phone numbers for the landowners. No properties were accessed without confirming permission from landowners or leasees beforehand. Where permission for access was clearly denied by a landowner no field data was gathered for that property unless it was clear they were happy for data to be gathered from offsite.

Landowners were asked about any health & safety hazards on their property to be aware of. High visibility vests were worn where this was appropriate.

## 2.4. Field survey

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The field survey was led by Hamish Kendal (Natural Solutions) and assisted by Scott Sambell (Ethos Environmental). The survey was undertaken between 30<sup>th</sup> Jan – 7<sup>th</sup> Feb 2018. A 4wd car and electric bicycle were used for transport around the catchment and farm races where it was

safe. All other surveying was undertaken on foot. All surveying was done with two people on site in the catchment, and radio/cellphone communication was maintained.

Each field person had a tablet and a smartphone with the Arc Collector software into which data could be entered in the field. The collected data was synced with the main geodatabase at every opportunity, which secured the data and also allowed others to have live updates as the data was collected.

Properties were visited only where it was necessary to view streams and other features that could not be seen from the road or neighbouring land. Some properties were able to be surveyed without entering them, and so these landowners were not contacted. The survey included all streams defined by the Hydro\_50k stream dataset, except where they didn't exist on the ground (presumably due to the natural stream having been diverted into drains). Other waterways were assessed including significant ephemeral streams or seepages and major drainage channels on the floodplains.

Natural feature LCDB polygons over 0.5 hectare were rapidly assessed to confirm vegetation type and potential significance. Additional potentially significant natural areas were added to the LCDB layer. Smaller wetlands and seepages which were grazed and dominated by exotic vegetation were captured by riparian lines. Stock access to natural features was indicated in the LCDB polygon whenever stock had access to any part of a natural feature.

Other catchment features were captured as they were encountered.

Where photos were taken they were attached to the corresponding GIS feature.

## 2.5. GIS processing and analysis

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The catchment feature data collected in the field was collated in ArcGIS for processing, analysis and checking:

- Riparian stock access and vegetation lines were aligned with each other and the Hydro\_50k line, or they were aligned approximately with the additional waterways they mapped as seen on satellite imagery.
- Waterways that came from 'seepages' were separated into their own layer. These were often short and wide waterways in the bottom of gullies that have potential for wetland restoration.
- Potential fish barrier data was separated into their own layer.
- The data was analysed to calculate the totals and percentages of the lengths, areas and numbers of catchment features.
- A separate layer of "survey notes for client" was included with relevant field notes.
- GPS tracks of survey routes were clipped to remove double-ups.



## 3. Results

### 3.1. Properties surveyed

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The total Okarika pocket catchment area is 5,220 ha containing 65 properties. Of this:

- 4,489 ha (59 properties) were surveyed. Of these:
  - 4,078 ha (43 properties) were surveyed on site;
  - 410 ha (16 properties) were surveyed off site.
- 670 ha (6 properties) were not surveyed. Of these:
  - 525 ha (3 properties) due to the owners denying survey permission;
  - 99 ha (2 properties) where the owners were unable to be contacted before the end of the survey;
  - 46ha (1 property), a scenic reserve, being inaccessible through another property where survey was denied.

Catchment features were assessed on some of the non-surveyed properties where they could be seen from off site.

### 3.2. Catchment features

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The analysis of riparian feature data is presented in Table 3. The natural features, erosion, threatened species, weeds, stream structures and blockage features are presented in Table 4.

The catchment features were supplied to Whangarei DoC as an ArcGIS geodatabase. The features can be represented as a map in an infinite variety of ways depending on what needs to be viewed. Any photos taken are attached to the corresponding catchment feature.

#### Riparian margins

The length of all the waterways surveyed was 286,061m. This includes those represented by the Hydro\_50k dataset stream lines, and other waterways including those assessed as significant ephemeral streams or seepages, and major drainage channels on the floodplains.

Summary of the significant results for waterway riparian margins:

- 43% are stock proof on both sides. 57% have stock access directly to waterways.
- 91% have grass and/or exotic trees on both sides.
- 3% are stock proof and have native vegetation both sides.
- 49% have stock access and grass on both sides.

The discrepancy between the total length of Riparian Stock Access vs Riparian Vegetation is because these were digitised independently. The Stock Access length was used for analyses.

**Table 3: Riparian features surveyed**

<b>Waterways surveyed</b>	<b>Length (m)</b>	<b>% of waterways surveyed</b>
Hydro-50k streams and other waterways	<b>286,061</b>	<b>100.00%</b>
(Hydro-50k streams that don't exist)	<b>2,297</b>	
<b>Riparian – stock access</b>		
Stock proof both sides	124,102	43.38%
Stock proof one side*	92,529	32.35%
Stock access both sides	69,430	24.27%
<b>TOTAL</b>	<b>286,061</b>	<b>100.00%</b>
<b>Riparian – vegetation</b>		
Native both sides	19,120	6.73%
Grass both sides	235,693	82.95%
Exotic both sides	7,612	2.68%
Native TL / Grass TR	4,246	1.49%
Native TL / Exotic TR	91	0.03%
Grass TL / Exotic TR	7,172	2.52%
Grass TL / Native TR	1,549	0.55%
Exotic TL / Native TR	318	0.11%
Exotic TL / Grass TR	8,349	2.94%
<b>TOTAL</b>	<b>284,150</b>	<b>100.00%</b>
<b>Riparian – stock access &amp; vegetation</b>		
Stock proof, native both sides	8,739	3.05%
Stock proof, grass both sides	99,032	34.62%
Stock proof, exotic both sides	5,151	1.80%
Stock access, native both sides	10,632	3.72%
Stock access, grass both sides	140,104	48.98%
Stock access, exotic both sides	2,301	0.80%
Other combinations	22,403	7.83%
<b>TOTAL</b>	<b>286,061</b>	<b>100.00%</b>
<b>Riparian erosion</b>		
Stream bank erosion**	1,195	0.42%

\* Stock often have access to both sides of a stream where there is a fence on one side.

\*\* Calculated as a % of Total Riparian Stock Access

## Other catchment features

Summary of the significant results for 'Other' catchment features surveyed:

- 84 potentially significant natural features, of which 72 are forest and 12 wetlands.
- Stock have access to 51 of 84 natural areas.
- 27 potential fish barriers.
- 9 sites of erosion.

**Table 4: Other features surveyed.**

<b>Land erosion</b>	<b>Area (ha)</b>	<b>Number</b>
Gully/tunnel	0.00	0
Harbour edge	0.00	0
Mass movements, slips/bumps	1.45	9
Sheet / rill / pugging	0.00	0
Stream bank	0.00	0
<b>TOTAL</b>	<b>1.45</b>	<b>9</b>
<b>Significant natural features (native forest or wetland)</b>		
Existing natural features from LCDB (surveyed)	797.56	69
Added natural features	22.72	15
<b>TOTAL</b>	<b>820.28</b>	<b>84</b>
All natural features – forest only	393.55	72
All natural features – wetland only	426.73	12
<b>Stock access</b>		<b>Number</b>
Stock have access to SNF		51
Stock do NOT have access to SNF		33
<b>Weeds and Threatened species</b>		
Weed infestations recorded		6
Threatened species sites recorded		0
<b>Stream structures and blockages</b>		
Bund or stopbank		0
Crossing - bridge		0
Crossing - ford		1
Culvert		23
Infilling or floodplain		0
Weir		3
Blockage - Vegetation		0
Blockage - Gravel		0

## 4. Discussion

### 4.1. Landowners

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Most landowners were aware of the project before they were contacted by Natural Solutions for the survey, and so were expecting us. Some were not aware because they were not the specific person that had been contacted. Showing a printed copy of the letter and map about the project was helpful, particularly to point out the paragraph explaining their property information was to be kept confidential. Landowners were generally obliging to provide access for the survey, with only 3 properties not allowing access.

The visual geodatabase was an essential tool for this project, as there was a jigsaw puzzle of property boundaries, catchment features and people to manage. The database enabled all of this to be ordered and tracked live online, and the permissions for access to be recorded with phone numbers, dates, hazard information and any other relevant notes. Having a tablet with a zoomable map with property boundaries and a clear aerial image was excellent for confirming the property boundaries with landowners, discussing routes, features, hazards, fencing etc.

There were no significant health and safety issues encountered on any properties other than the common risks with electric fences, bulls and drains. Landowners were asked if there were other potential hazards before entering their property. Other obvious hazards were the slippery conditions and waterways, though walking through steep gullies was generally avoided. We provided our own transport either in 4wd vehicle, electric bicycle or walking. If it was necessary, we let owners know where we planned to go, and when we had left their property. Many areas were viewed from the roadside, therefore wearing hi viz and taking care to keep well off the road was important. There were 2 people surveying the catchment, using VHF radios and cell phones to maintain contact. There were no safety incidents while completing the field work.

The only feedback from landowners about the project was their interest in being involved with more detailed farm plans and Living Water helping resource projects on their properties.

### 4.2. Feature capture

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The following comments are made for each landscape feature captured in the survey:

#### **Properties surveyed**

- The total property number/area includes part-properties that lap inside the survey boundary. These often did not have any features to survey.
- Properties include publicly-owned land managed by DoC, Council or The Northland Catchment Commission.

#### **Riparian stock access**

- A stock proof waterway included those within fenced vegetated areas, and those with fencing beside the waterway or set back any distance excluding stock. Natural or man-

made features could ensure a waterway was stock proof. A farm track was considered as a paddock if it was not fenced from a waterway, but a public road or residential yard was considered stock proof. Each waterway was assessed for the ability of stock to directly access into the water from each side.

- A fence needed to be permanent but could be of any type in detail (e.g. single electric or 8 wire post and batten) if it was considered stock proof for the stock on the land. What was not considered to provide permanent stock proof to waterways was electric tape on pigtail standards, although it was often noted in the notes section of the database.
- A stream fenced on one side was usually grazed on both sides, and the fence is practically only a paddock boundary that happens to be on one side of the stream. This is significant, because a fence on one side does not prevent stock access to a waterway. However, these streams are already half way to excluding stock from that stream.
- Farmers have their own stock-management motivations for not wanting stock in waterways including: losing stock, mixing with neighbour's stock, and having healthier trough water in which they can also deliver other minerals to the stock.
- There is a need to consider fencing design and setback for accessing drains to clear them.

### **Riparian vegetation**

- Vegetation was recorded in the field as either native, grass or exotic depending on which had the dominant cover for that length of riparian waterway. Often there was a mix of species. Exotic was applied to larger shrubs and trees only, and Native was applied to native forest and wetland vegetation.
- Most fencing along drains on the floodplain was positioned so that it restricted stock from directly entering the waterway but usually did not provide much width of un-grazed vegetated buffer for filtering land run-off.

### **Potentially significant natural features (native forest/wetland)**

- The 2012 LCDB layer often correctly determined vegetation canopy categories. These were checked in the field and any incorrect attributes revised, and the polygons adjusted to better represent the shape of the actual vegetation cover.
- Any potentially significant natural features identified in passing were added to the LCDB layer, although a more detailed survey would need to be undertaken to more accurately confirm their ecological value and the opportunities for restoration. The size of natural features added was limited to those over 0.5ha, although some smaller ones remain in the database.
- There were many small wetland seepages scattered across the landscape associated with the bottom of gullies. These were captured within the riparian features (as Riparian Stock Access or Vegetation line features) then represented as its own separate 'seepage' feature. There are many opportunities for wide riparian fencing margins encompassing these areas.
- Where an LCDB was confirmed to be native (forest or wetland) it was assigned to have 'stock access' unless it could be determined to be entirely stock proof. With this rapid survey method, it was not possible to map in any more detail where fencing specifically surrounds natural features.

### **Riparian erosion**

- Very little riparian erosion of stream banks was observed. This may partly be due to the survey method not following the whole length of hill-country waterways.
- There is one length of erosion recorded for a new floodplain farm track with an edge on a drain.

### **Land erosion**

- Fresh slips and mass movements were recorded, however there was less erosion encountered than was expected. There were small erosion scars caused by bulls rubbing the ground, but these were not recorded as erosion.

### **Potential fish barriers**

- Stream structures were inspected only where they were suspected to have a potential fish barrier, and only those with potential fish barriers were recorded. The predominant areas inspected were culverts in the hill country and where major waterways crossed public roads and tracks.
- Most of the potential fish barriers were culverts that were perched on the downstream end creating a waterfall. The upstream sides of culverts weren't inspected.
- Potential fish barrier data has been separated so that they can be easily identified in GIS.
- Tidal floodgates and the pump station were recorded under 'weir' and a note made.

### **Stream blockage**

- No vegetation or gravel blockages were observed.

### **Weeds**

- Common weeds such as woolly nightshade, pampas, privet, Jerusalem cherry and gorse occurred across the catchment but were not specifically recorded.
- Wandering jew was recorded in a few waterways, because it is a significant weed of riparian margins and floodplain forest and is transported down flooded streams. It will be much more widespread than has been recorded.
- Arum lily and Japanese honeysuckle were noted at one site each in the database, but these are common weeds that are likely to be at many other sites.

### **Threatened species**

- No threatened animal or plant species were directly observed, although the following species are known to be present in the catchment: brown kiwi, Australasian bittern, NZ dabchick, freshwater tuna, a mudfish, a pittosporum and a hebe.
- Common native bird species that were noticed in the catchment during the survey: pukeko, Australasian harrier, a shag, spur-winged plover, kereru, tui and kingfisher.

### 4.3. Potential applications of data

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The Okarika catchment dataset provides a valuable information and monitoring tool for the Living Water programme, local catchment management groups and landowners. The dataset is powerful in a visual map format to help identify opportunities with landowners and community groups for catchment management. It will be helpful to:

- work with landowners to identify waterways that could be fenced, including those fenced only on one side;
- estimate waterway lengths for fencing (note that the actual length of fencing required is likely to be longer than the measurements in the database);
- target particular waterways from 'mountains to sea' that have the potential to be completely stock proof, and that link natural features through farmland;
- identify potential fish barriers for closer inspection;
- discuss fencing, restoration and legal protection of significant natural features with landowners; and
- identify erosion hotspots.



## Bibliography

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Kendal, H.D. 2017: *Pūkorokoro-Miranda Catchment - Condition Survey Report, June 2017*. Department of Conservation, for the Living Water Partnership. Natural Solutions Contract Report 17/156.



### Appendix A: Living Water catchment survey letter/map

**LIVING WATER**   Department of Conservation  
Te Papa Atawhai

30 January 2018

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Surname  
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Dear Sir / Madam

**Catchment Condition Survey – Living Water**

Living Water is a \$20m, 10 year partnership between the Department of Conservation and Fonterra working in 5 significant catchments to demonstrate sustainable dairying in healthy freshwater ecosystems. Wairua River (Hikurangi Floodplain) is one of these 5 catchments where we are undertaking demonstration projects with community partners.

In order for Living Water partners to know more about the catchment and help prioritise where resources are best invested, we have commissioned a [catchment condition survey](#). The catchment survey involves mapping local natural features like waterways, bush blocks, erosion areas and native species. After the catchment survey is completed, we will be able to prioritise activities and locations where we can best contribute to achieving the community's freshwater outcomes. The survey will also be used as a baseline monitoring tool so we can measure how much we have all achieved over the lifetime of the projects.


Living Water is a proactive, non-regulatory programme, which means the data that we collect will only be used for the purpose of supporting landowners to achieve improved freshwater outcomes. The data collection system we are using is based off a council survey, but this information obtained will not be shared outside of the Living Water team unless written consent is given by you to do otherwise.

To give a good account of the catchment, much of the land will have to be physically walked by a contractor (Natural Solutions Ltd). This means we may need to ask permission from you to access your property for a short time. If this is the case, the contractors will contact you by phone in the first instance and visit you in person prior to walking on your property.

If you have any questions, please contact me any time on the phone number below.

Thank you for your time. We look forward to working with you.

Yours sincerely



**Ben Herbert**  
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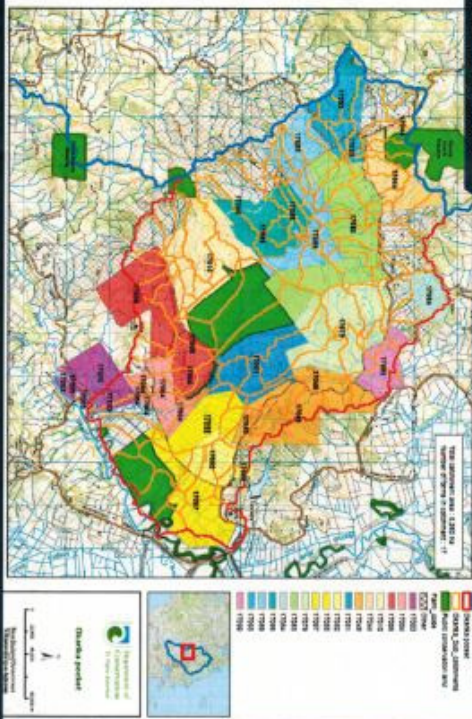
# OKARIKA POCKET TRANSFORMATION PROJECT

Kaipara Harbour, Wairua Catchment - Hikurangi Flood Plain

## Landowner Summary

LIVING WATER

### CATCHMENT MAP



### PROJECT OBJECTIVES AND ACTIONS

OBJECTIVES	ACTIONS
<ul style="list-style-type: none"> <li>- Restore freshwater ecosystems &amp; build ecological resilience</li> <li>- Accelerate environmentally sustainable farming practices</li> <li>- Work with farmers, iwi, partners and communities on scalable solutions</li> </ul>	<ul style="list-style-type: none"> <li>- Complete LW FEPs on all 11 farms</li> <li>- Agree on freshwater outcomes and identify and co-design improvement projects</li> <li>- Start project implementation</li> <li>- Monitor outcomes and through case studies share the results with others</li> </ul>

**PROJECT PARTNERS:** Local landowners, farmers and community, Ngā Kaihaki O NgāWai Māori, Integrated Kaipara Harbour Management Group, Northland Regional Council, Whangarei District Council, Tānekaheka CPCA

**SITE FOCUS:** Reducing sediment loads into the Wairua River using solutions that both improve hydrologic function and build the ecological resilience of the catchment.

#### OPPORTUNITY

- This pocket has two large wetlands: both representing rare ecosystem types and is home to threatened species; Black mudfish, Australasian Bittern, Longfin Eel (tuna).
- Water quality can greatly affect the health of wetlands and streams. Partners of this project are committed to working with landowners to improve water quality and the freshwater ecology.
- We can make a difference! Fonterra farmers make up the majority of landowners in the catchment and Living Water is committed to working with all of them.

#### WORK COMPLETED SO FAR

- Biodiversity assessment on three (3) Fonterra farms. Riparian fencing and planting projects and developed with the landowners and funded by Living Water.
- Baseline ecological restoration opportunities survey and report.
- Living Water has undertaken ecological and hydrological monitoring in the Okakarangi wetland and created a management strategy and action plan for Wairua wetland.
- With integrated Kaipara Harbour Management Group provided 20,000 plants to farmers.
- Supporting eel survey, monitoring, research, and habitat restoration with Ngā Kaihaki O Ngā Wai Māori and NIWA in the Wairua River catchment.

#### WHAT IS LIVING WATER COMMITTED TO?

1. Healthy resilient lowland freshwater ecosystems.
2. Profitable responsible dairying.
3. A shared understanding of the interdependence of agriculture, economy and environment.