



BAY OF PLENTY  
REGIONAL COUNCIL  
TOI MOANA

# Brown Bullhead Catfish Incursion Management Report - 2016-2017

Bay of Plenty Regional Council  
Environmental Publication 2017/05  
July 2017

Prepared by Shane Grayling, Biosecurity Team Leader  
Photo supplied by Glen MacLean, Department of Conservation

5 Quay Street  
P O Box 364  
Whakatāne  
NEW ZEALAND

ISSN: 1175-9372 (Print)  
ISSN: 1179-9471 (Online)

# Contents

<b>Population control and statistics – Lake Rotoiti</b>	<b>2</b>
<b>Catch rates</b>	<b>2</b>
<b>Size distribution</b>	<b>6</b>
<b>Net comparison</b>	<b>7</b>
<b>Conclusion</b>	<b>7</b>
<b>Te Weta Bay aquatic pest cordon</b>	<b>8</b>
<b>Research programme – supported by the University of Waikato and NIWA</b>	<b>9</b>
<b>Stable isotope analysis</b>	<b>9</b>
<b>Acoustic tagging trial</b>	<b>9</b>
<b>Surveillance in other lakes</b>	<b>10</b>
<b>Priorities for 2017/18</b>	<b>11</b>

# Part 1:

## Population control and statistics – Lake Rotoiti

Fyke netting around Lake Rotoiti continued in response to the brown bullhead catfish incursion discovered in 2015.

Methods used were similar to last year apart from two subtle differences:

- 1 We began using fine mesh fyke nets in combination with coarse mesh to compare effectiveness. This is discussed below.
- 2 Towards the end of year, netting was more targeted around preferred habitat. This was based on observations from the contractor.

### Catch rates

Between 1 July 2016 and 30 June 2017, netting was undertaken over 68 nights. The results of the netting are summarised below:

Site	Nets set	Catfish caught	Percentage of total catch	Catch per unit effort
Te Weta Bay	914	3227	98.62%	3.53
Okawa Bay	146	6	0.18%	0.04
Okere Inlet	390	19	0.58%	0.05
Otaramarae	114	2	0.06%	0.02
Northern Shore	292	4	0.12%	0.01
Southern Geothermal	234	14	0.43%	0.06
OTHER	220	0	0.00%	0.00
<b>TOTAL</b>	<b>2310</b>	<b>3272</b>	<b>100.00%</b>	<b>1.42</b>

**Northern shore** - between entrances of Okere Inlet and Otaramarae.

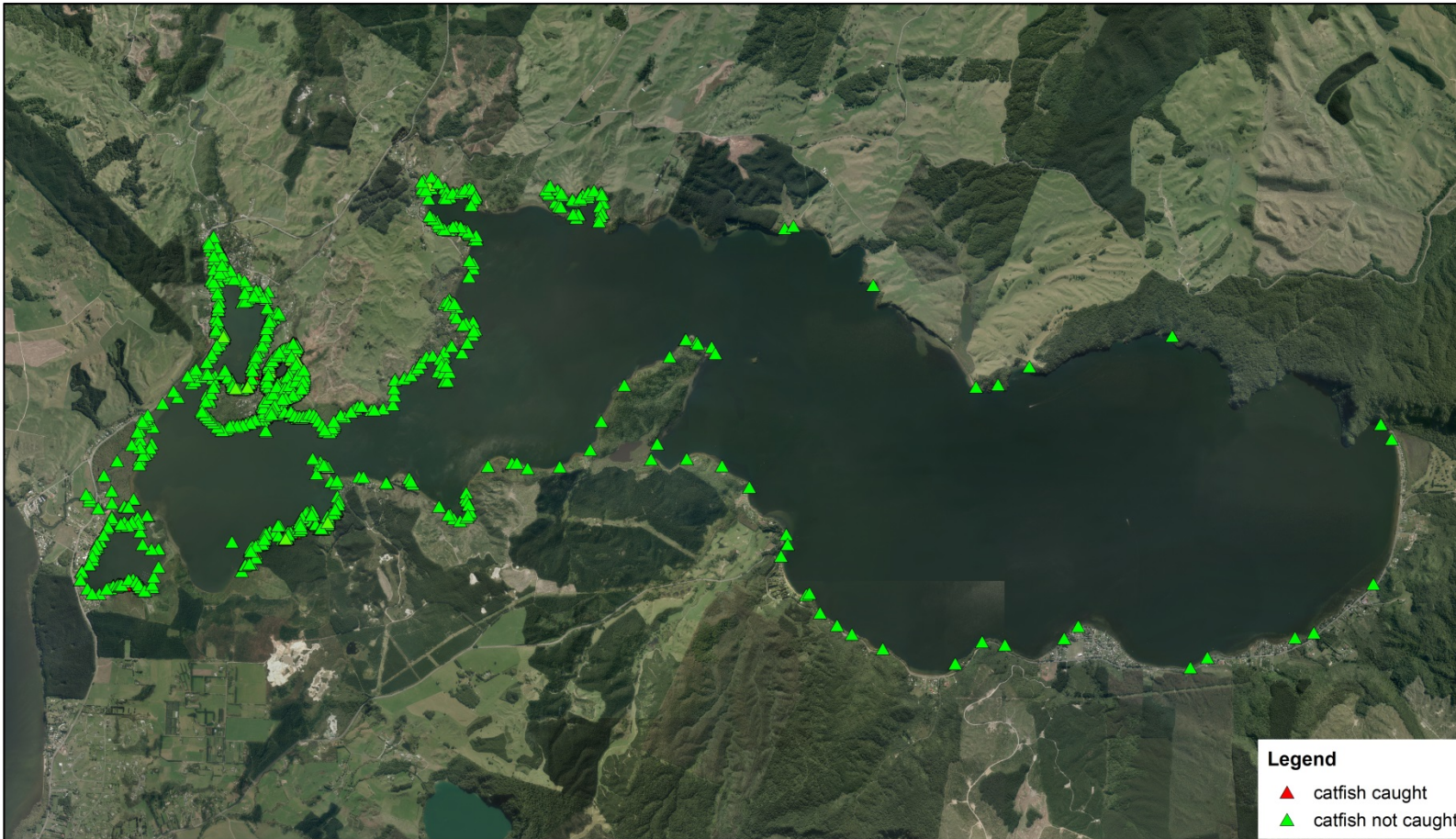
**Southern geothermal** - between entrance to Okawa Bay and Rotoiti hotpools.

**Other** - east of Otaramarae (including Te Arero Bay) to Rotoiti hotpools.

Catch rates in Te Weta Bay continue to be much higher than other parts of the lake. This year it accounted for 98.62% of the total catch. This included a single net that caught 1227 juveniles, 14 mm in length, in March.

Catch per unit effort is a common term used in fisheries management. It describes how many fish were caught compared to the number of nets set. Te Weta Bay averages 3.53 catfish per net which is much higher than any other site. These figures support our belief that the majority of the population are still located within the bay.

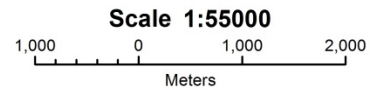
Catfish were caught at more sites compared to last year, which is disappointing but not surprising. At this stage, they seem to be in low numbers at all sites apart from Te Weta Bay, though they are spread further around the lake than we would have hoped. Maps showing where nets have been set and where catfish have been caught are provided below. It shows most effort was focussed on the western end of the lake. This is due to more suitable habitat and based on previous catches.



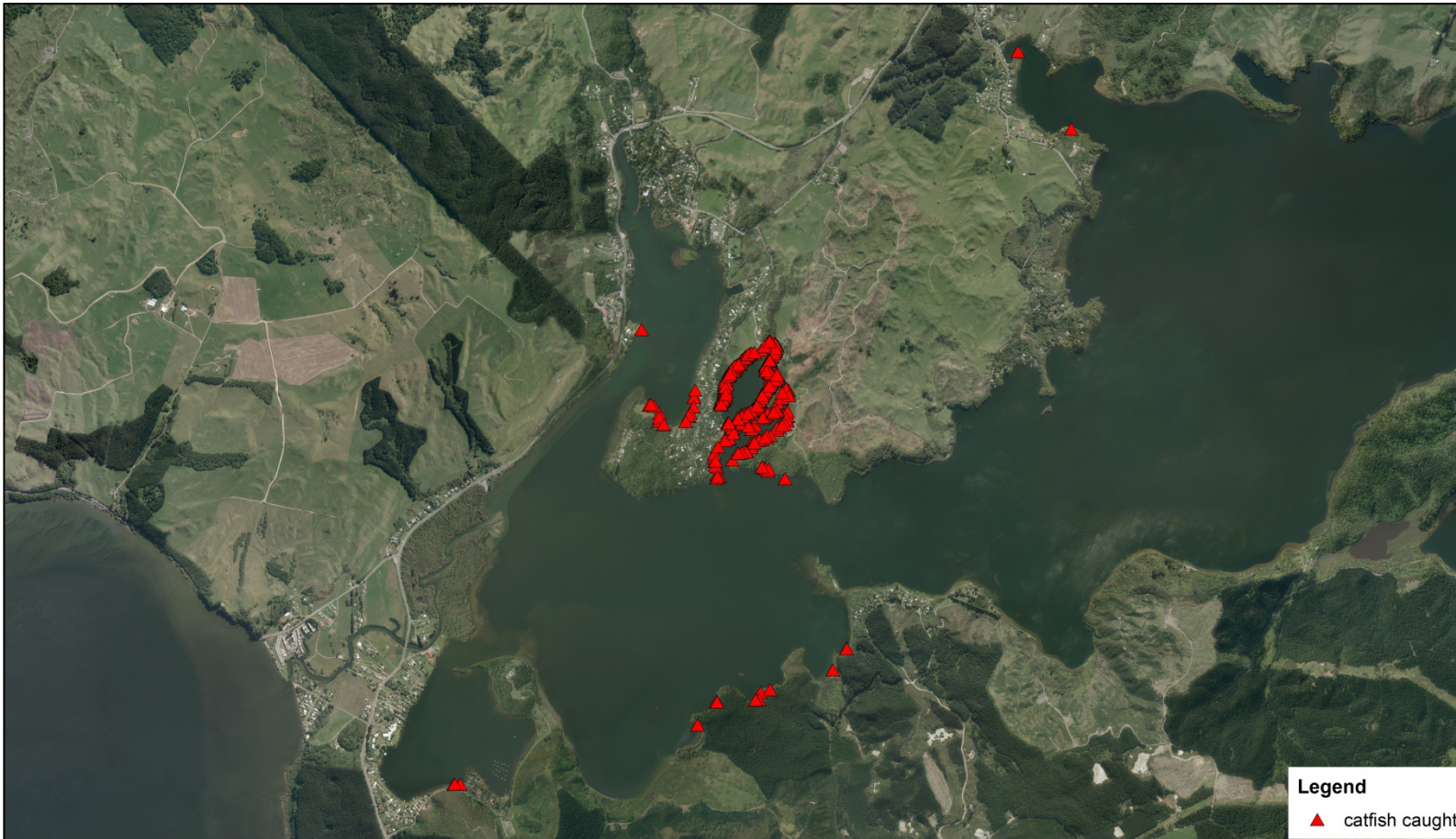
HORIZONTAL DATUM: New Zealand Geodetic Datum 2000  
 For practical purposes, NZGD2000 equates to WGS84  
 VERTICAL DATUM: Mean Sea Level  
 PROJECTION: New Zealand Transverse Mercator 2000

© Bay of Plenty Regional Council, 2014  
 © Sourced from Land Information New Zealand data.  
 CROWN COPYRIGHT RESERVED

### Lake Rotoiti catfish surveillance effort - 2016/17



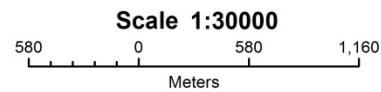
Sheet 1 of 1  
 Printed 28/06/2017



HORIZONTAL DATUM: New Zealand Geodetic Datum 2000  
 For practical purposes, NZGD2000 equates to WGS84  
 VERTICAL DATUM: Mean Sea Level  
 PROJECTION: New Zealand Transverse Mercator 2000

© Bay of Plenty Regional Council, 2014  
 © Sourced from Land Information New Zealand data.  
 CROWN COPYRIGHT RESERVED

### Lake Rotoiti catfish caught - 2016/17



**Legend**  
 ▲ catfish caught

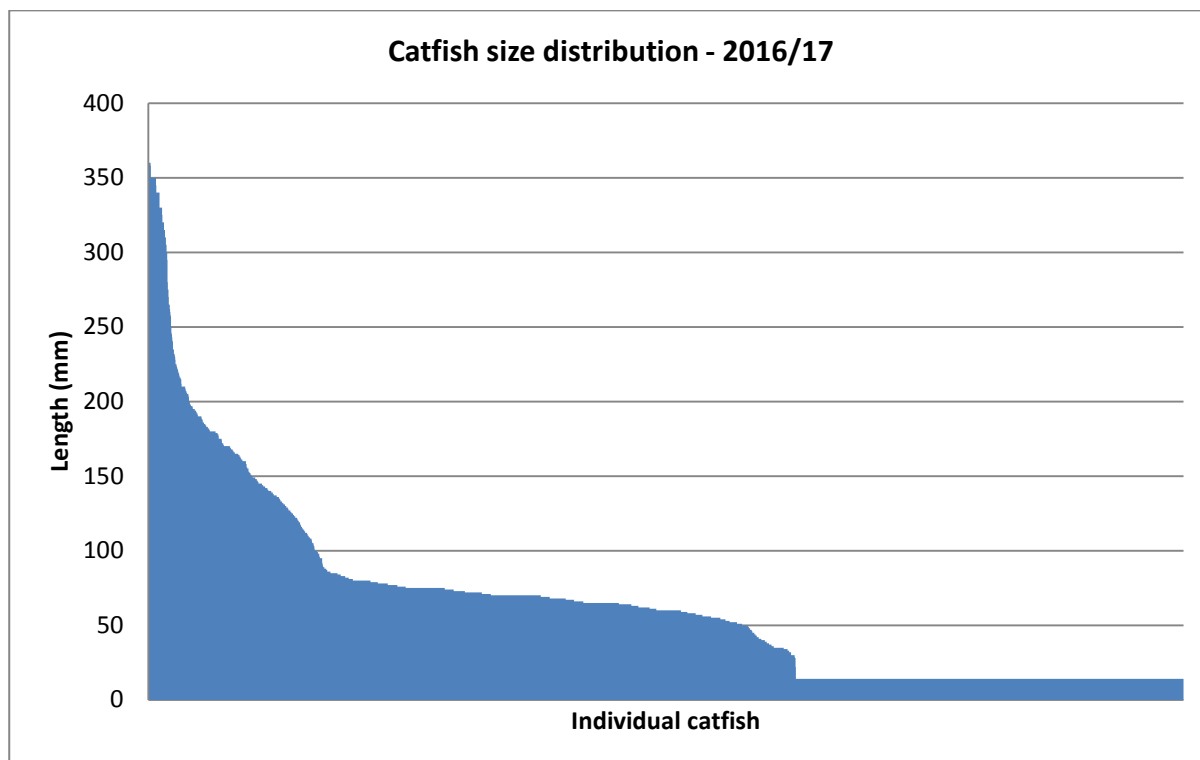
Sheet 1 of 1  
 Printed 28/06/2017

## Size distribution

The table and graph below summarise the size range of the catfish caught during the year. Over 80% of the catfish caught were less than 100 mm in length, at this size they would be immature and unable to reproduce:

Length	Number of catfish	% of catch
351-400 mm	8	0.24%
301-350 mm	50	1.53%
251-300 mm	14	0.43%
201-250 mm	56	1.71%
151-200 mm	198	6.05%
101-150 mm	200	6.11%
51-100 mm	1351	41.29%
0-50 mm*	1395	42.63%
<b>TOTAL</b>	<b>3272</b>	<b>100.00%</b>

\*includes 1225 catfish 14 mm in length from one net



## Net comparison

This year we made a couple of subtle changes to our netting programme. Initially, coarse mesh nets were used to prevent bycatch of other small fish species, particularly bullies. On the advice of NIWA we started using fine mesh nets. Throughout the year we used roughly a 70:30 split of fine mesh compared to coarse. As the statistics below show, fine mesh nets are much more effective at catching catfish accounting for over 91% of the catch:

Site	% caught using fine mesh	% caught using coarse mesh
Te Weta Bay	91.41%	8.59%
Okawa Bay	83.33%	16.67%
Okere Inlet	87.50%	12.50%
Otaramarae	100.00%	0.00%
Northern Shore	75.00%	25.00%
Southern Geothermal	50.00%	50.00%
<b>TOTAL</b>	<b>91.21%</b>	<b>8.79%</b>

## Conclusion

Catfish were found in much higher numbers and over a larger area than the previous year. This is the first full year of netting completed, therefore, is a more accurate reflection of the size of the issue we are managing. Catching 1,200 juvenile catfish in a single net was a real eye opener. Young catfish are thought to stay near their nest for a period before dispersing in small shoals. Was this catch a single spawning event? While we can only guess potentially it could be, they are thought to produce up to 6,000 eggs or more so it is not beyond the realms of reality.

All along we have stated we are going to have to be innovative to be successful, that sentiment has not changed. Using current best practice methods is not going to be enough. This is the driver for the installation of the cordon and development of the science programme which are discussed below.



## Part 2:

# Te Weta Bay aquatic pest cordon

The cordon at the entrance to Te Weta Bay was successfully installed in April 2017. As the catch summary shows, the vast majority of the population is still inside the bay. The purpose of the cordon is to seal the entrance to the bay and contain the population. This will serve two purposes:

- 1 Prevent the population from spreading further around the lake.
- 2 Allow us to target areas outside the cordon, safe in the knowledge that the majority of the population is contained.



After the installation, the region was hit by a number of cyclones. This caused some small scale damage to the cordon. A decision was made that some remedial works were required to ensure the longevity of the cordon. These were completed in June 2017.

# Part 3

## Research programme – supported by the University of Waikato and NIWA

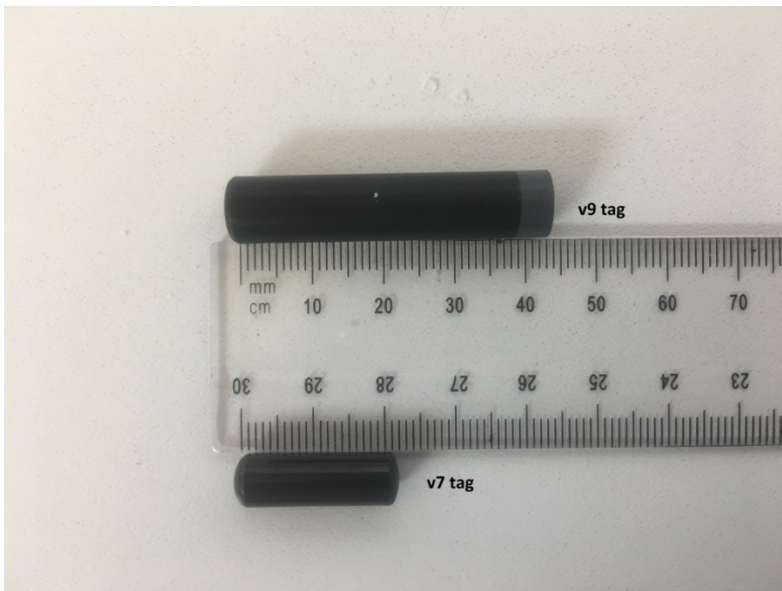
### Stable isotope analysis

Stomach contents from 100 catfish were sent to the University of Waikato for stable isotope analysis. Stable isotope analysis uses aspects of the gut content, namely carbon and nitrogen ratios, to determine what an animal is preying on and its potential impacts on ecosystems.

The gut contents have been processed but the results have not yet been analysed. This will happen next year.

### Acoustic tagging trial

Planning for the acoustic tagging trial is underway. The plan is to fit 30 catfish with Vemco v7 or v9 acoustic tags and monitor their movements for up to one year. Acoustic receivers will be strategically placed throughout the lake and will log the movement of individual fish. Some of the tags will also record temperature and depth of the fish which could show some interesting trends, particularly over the colder months.



Range testing of the tags is underway. This will tell us how spread the receivers should/can be around the lake. Shortly, a small tag retention trial will begin to ensure catfish do not reject the tags. This is an important step before we begin the field trial as catfish are notorious at rejecting tags.

When the trial begins, catfish will be released inside and outside the cordon. The fish released inside will prove the integrity of the cordon, and how driven catfish are to leave the bay and migrate around the lake. The fish released outside will give us a much better understanding of how they utilise the lake and potentially preferred habitat at different times of year.

# Part 4

## Surveillance in other lakes

Surveillance was undertaken in Lake Rotomā and Ōkāreka during the year to ensure that catfish were not present. No catfish were found. Surveillance on Lake Rotoehu was delayed due to weed abundance that would have made the netting ineffective. Maps showing the surveillance effort are provided below.

# Part 5

## Priorities for 2017/18

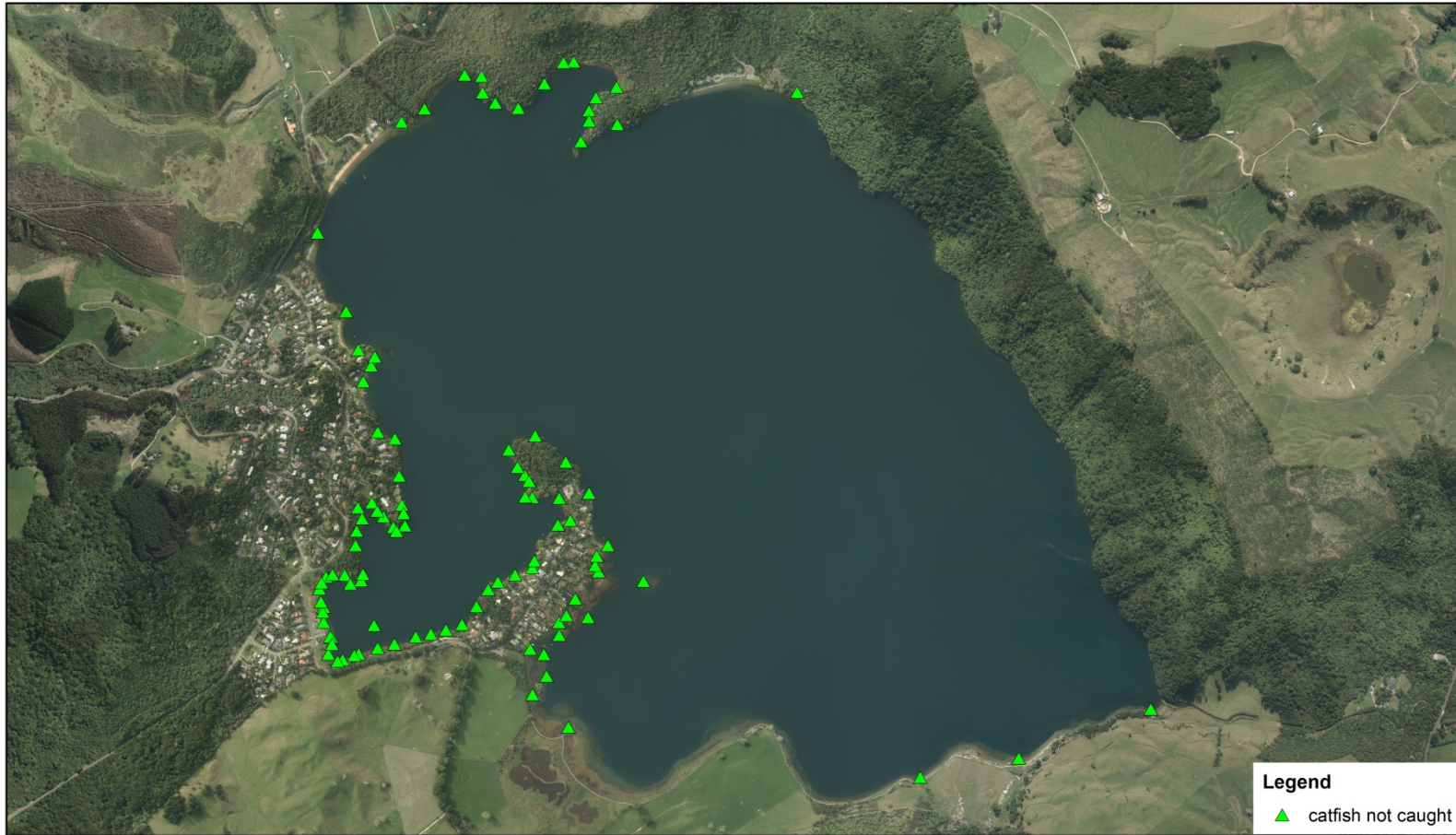
The netting and research programme will continue in 2017/18. Priority projects include:

- 1 Continued population suppression with increased emphasis outside of Te Weta Bay.
- 2 Surveillance in Lake Rotoehu, Ōkātaina and Rotorua.
- 3 Undertake acoustic tagging and best practice netting methods trials.
- 4 Begin the environmental DNA project to support surveillance work.
- 5 Analysis of stable isotopes results.

Other activities that will be undertaken within the project include:

- Determination or confirmation of best practice methods.
- Tag recapture work to determine population estimates.
- Netting in other lakes around the region.

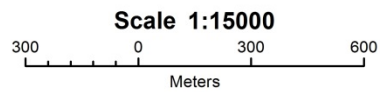
Next year will be an important year to determine the effectiveness of the cordon and whether our current effort is having any impact on the population. It will also add to our understanding of catfish movement around the lake and will hopefully allow us to better target them in the future.



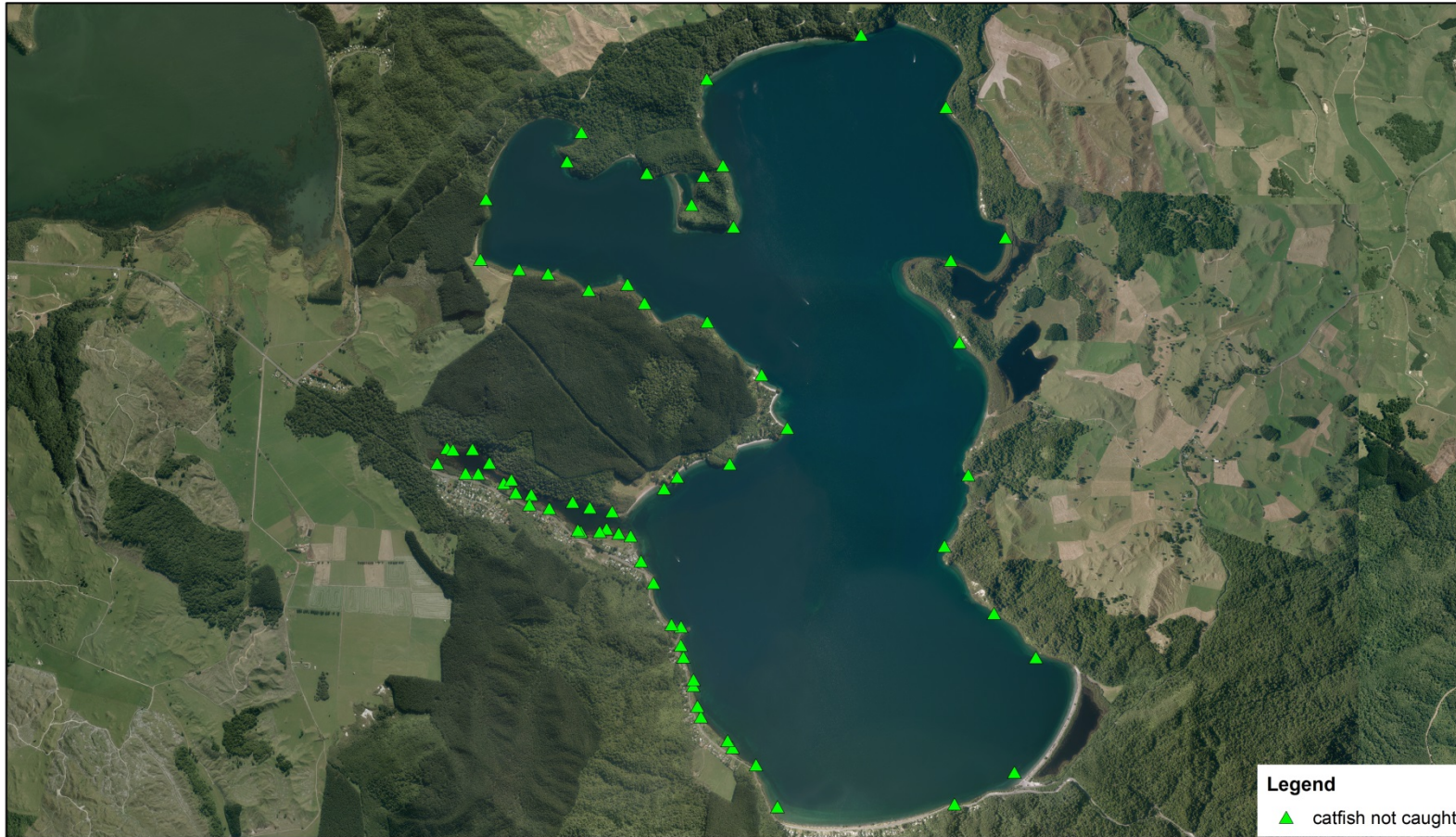
HORIZONTAL DATUM: New Zealand Geodetic Datum 2000  
 For practical purposes, NZGD2000 equates to WGS84  
 VERTICAL DATUM: Mean Sea Level  
 PROJECTION: New Zealand Transverse Mercator 2000

© Bay of Plenty Regional Council, 2014  
 © Sourced from Land Information New Zealand data.  
 CROWN COPYRIGHT RESERVED

### Lake Okareka catfish surveillance effort - 2016/17



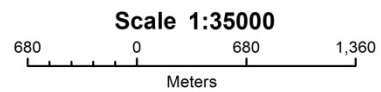
Sheet 1 of 1  
 Printed 29/06/2017



HORIZONTAL DATUM: New Zealand Geodetic Datum 2000  
 For practical purposes, NZGD2000 equates to WGS84  
 VERTICAL DATUM: Mean Sea Level  
 PROJECTION: New Zealand Transverse Mercator 2000

© Bay of Plenty Regional Council, 2014  
 © Sourced from Land Information New Zealand data.  
 CROWN COPYRIGHT RESERVED

### Lake Rotoma catfish surveillance effort - 2016/17



Sheet 1 of 1  
 Printed 29/06/2017