Consent Holder Annual Report

Okere Gates and Ohau Weir - 1 June 2015

Bay of Plenty Regional Council
Operations Publication 2015/04

5 Quay Street
PO Box 364
Whakatāne 3158
NEW ZEALAND

ISSN: 1176-5550 (Print)
ISSN: 1179-9587 (Online)

BAY OF PLENTY REGIONAL COUNCIL
TOI MOANA

Consent Holder Annual Report on Okere Gates (Consent 65979) and Ohau Weir (Consent 65980) – 1 June 2015

Operations Publication 2015/04
ISSN: 1176-5550 (Print)
ISSN: 1179-9587 (Online)

June 2015

Bay of Plenty Regional Council
5 Quay Street
PO Box 364
Whakatāne 3158
NEW ZEALAND

Prepared by: Graeme O'Rourke
Principal Engineering Officer/Surveyor

Cover photo: Ohau Weir – 11 February 2013

Acknowledgements

Bay of Plenty Regional Council's (BOPRC's) Survey and Environmental Data Services (EDS) teams are acknowledged for their invaluable contributions.

Their work in groundwater monitoring, asset capture, cross section surveys, velocity monitoring and software support has contributed to the findings of this report.

West Rotoiti 6971 Fire Brigade (Andy Uhl) are also acknowledged for their response during the Police Search and Rescue Operation in March 2015.

Figure 1 *GPS equipment used to establish a Survey Control Network around Rotorua lakes - BM AQ69 at State Highway 33/Hamurana Road turnoff.*

Executive summary

This report covers the 12 months of operations from 1 April 2014 to 31 March 2015 (referred to as 'this term' or 'this period') and will discuss:

- Actual distribution of lake levels compared to the target distributions.
- Actual flow rates compared to minimum flow rates.
- Operational difficulties.
- Stakeholder consultation.
- Complaints and investigations.
- Conclusions.

Resource Consents 65979 and 65980 approve the continued placement, operation and maintenance of the Okere Gates and the Ōhau Channel Weir structures that are located at the outlets of Lake Rotoiti and Rotorua respectively.

For this term, lake levels and flow rates were well below normal volumes following long periods of low rainfall and reduced inflows.

As a result, lake level distributions over the various ranges varied from negative 22.3% to +18.8% (zero % variation = target value).

The 'main operating range' of Reduced Level (RL) 279.10 m to 279.20 m was maintained for only 47.7% of the time (70-85% allocated) compared to 266 days (72.9%) for the last term (1 April 2013–31 March 2014).

In the 'secondary range' from RL 279.05 m to 279.25 m, 320 days were recorded or 87.7% of the 12 month term (91% allocated or 332 days).

For this reporting period, there were 357 rafting days (97.8% of term). This compares with 352 days or 96.4% in the previous term (2013) and 293 days or 80.3% in 2012.

The annual drawdown of Lake Rotoiti lasted 130 days commencing on 27 April 2014 and concluded 3 September 2014. In 2013, the duration of the drawdown was 47 days.

There were two occasions this term when lake levels exceeded RL 279.20 m following short rain events on the 19 April and 14 September 2014. The highest lake level recorded for this term was RL 279.224 m. This compares to RL 279.259 m in 2013, RL 279.381 m in 2012 and RL 279.367 m in 2011. Lake levels did not exceed the consented maximum of RL 279.40 m but fell below the consented minimum of RL 279.00 m for 21 days during the annual drawdown of Lake Rotoiti as a result of no rainfall.

Okere Gates outflows were greater than Ōhau Channel inflows nearly 100% of the time except for a time on 11-12 March 2015 when the Okere Gates were closed down to assist police in an emergency search and rescue operation. Otherwise, there were no other reflux issues as outflows were maintained. Reflux occurs when outflows through the Okere Gates are less than the inflows causing Lake Rotorua water to enter the main body of Lake Rotoiti.

There were no significant operational difficulties to report apart from minor technical issues with remote communications. These were addressed quickly and did not compromise consent conditions.

The Ōhau Channel stoplogs have been in place since November 2013 while Lake Rotorua levels remained low.

Seven complaints were received this term from one resident following low lake levels and were addressed quickly or referred to the Regional Council's Regulatory Arm for action. General concerns regarding low lake levels were also addressed quickly with no further issue.

Communication was maintained across the various interest groups with ongoing communication with Iwi, Kaituna River Rafting, Rotorua Tourism, Fish & Game New Zealand and various lakeside residents over this period. Media were also kept informed at various times when needed.

Two investigations were completed this term to address flooding issues at Hinehopu and Mourea. The results of the Hinehopu Groundwater Study have been reviewed by Regional Council's Regulatory Arm and meetings with stakeholders are being planned in August or September 2015 to discuss report findings.

A proposal to construct a low-level bund (80 mm high) around reserve land at Mourea was cancelled and is currently before Regional Council's Regulatory Arm for review. A recent survey in February 2015 showed that general ground levels along the Ōhau Channel were higher than bund 'design levels' and therefore, the bund is no longer required.

Cross sections of the Ōhau Channel were completed during the 'annual drawdown' period in July 2014 and indicated general stability in bed levels. Velocity monitoring at the same time was also completed and again with previous year's results indicated negligible change or increase in velocities.

Rotoiti beaches and lake level staff gauges are monitored and photographed monthly and provide a robust and visual record of the lake environment.

It has been a challenging 12 month period to manage lake levels within the various consented ranges. However, the consent considers the effects of these extreme environmental conditions (both wet and dry) and has established guidelines in place to best manage lake levels accordingly.

At this stage, there are no recommendations to review any further consent conditions.

Contents

Tables and figures

Part 1: Introduction

1.1 Background

As Consent Holder, Bay of Plenty Regional Council's 'Natural Hazards Group' (now Technical Sevices Group) is required to submit an annual report by 1 June each year on the operation and performance of the Okere Gates and Ōhau Channel Weir in accordance with Resource Consent (RC 65979) Condition 15 and (RC 65980) Condition 12.

This year's report was delayed until 1 August 2015 to include a review of several consent conditions and will be reported later.

Lakes Rotoiti and Rotorua levels are controlled by the operation of the Okere Radial Gates and the Ohau Channel Weir respectively. The gates also regulate the rate of discharge from Lake Rotoiti to the Kaituna River.

The Okere Radial Gates and Ohau Weir are Bay of Plenty Regional Council assets and are part of the Kaituna Catchment Control Scheme. They are operated by the Natural Hazards Group (now Technical Services Group), in accordance with their existing resource consents.

The purpose of the Okere Gates is to increase the outflows from Lake Rotoiti to permit floodwater to be discharged when required, and to reduce outflows to prevent undesirable low lake levels. The impacts of the Okere Gates operation on Lake Rotorua levels are generally minor but significant to ensure all Lake Rotorua water passes through the gates to prevent reflux or mixing with Lake Rotoiti water.

The purpose of the Ohau Weir is to control the level of Lake Rotorua but predominantly to prevent undesirable low levels.

The Ohau Channel Weir was constructed in 1989 as a simple weir structure (double broad crested weir) with stoplogs.

The Okere Gates structure was constructed in 1982 and is a substantial radial triple gate structure.

Prior to the construction of the Okere Gates in 1982, there was a natural rock ledge (at approximately RL 278.5 m) about 35 m downstream of the existing gates, which naturally controlled Lake Rotoiti levels.

Both control structures were put in place as part of the Kaituna Catchment Control Scheme. Pre-scheme, there was no lake level control on either Lake Rotorua or Lake Rotoiti (apart from the natural rock ledge), with the result that lake levels fluctuated naturally with climatic conditions. The structures were designed so that the lake level ranges could be managed within the range set by the former National Water and Soil Conservation Authority (NWSCA), in 1975. These levels were included in BOPRC's Transitional Regional Plan, and are referred to in the existing consents granted for damming the outlets of both lakes.

The Ohau Weir and Okere Gates are operated and maintained as part of the Rivers and Drainage Asset Management Plan (AMP). The AMP outlines the requirements to inspect and maintain the structures over their expected life cycle.

The 35-year resource consents for Ohau Weir and Okere Gates were renewed and approved on 21 March 2012.

Figure 2 Locality map.

1.2 Reporting

It is a requirement of Bay of Plenty Regional Council Resource Consents 65979 and 65980 to report annually as follows.

Resource consent condition/s state:

(i) *RC 65979 – Condition 15 (Okere Gates – Lake Rotoiti)*

ANNUAL REPORTING

By 1 June each year for the term of this consent, the consent holder shall provide a report to the Chief Executive of the Bay of Plenty Regional Council or delegate, the Rotorua Te Arawa Operational Liaison Group (RTALOLG) and the Ohau ki Rotoiti Kaitiaki Group setting out:

(a) *the actual distribution of lake levels compared to the target distribution;*

(b) *the actual flow rates of the Okere Gates compared to the minimum flow rates;*

(c) *any difficulties experienced by the consent holder in achieving the target lake level ranges and minimum Okere Gate flow rates;*

(d) *a summary of any consultation undertaken with stakeholders in accordance with Conditions 9, 10, 11 and 14 of this consent;*

(e) *a summary of any investigations undertaken as a result of complaints about the adverse effects of the lakes;*

(f) *methods for how any difficulties in achieving target level ranges and Okere Gate minimum flows have and will be resolved and how any complaints about the adverse effects of lake levels have been responded to; and*

(g) *methods proposed to resolve any issues that may have risen including operational difficulties, water quality, and extreme weather events, and any changes required to the Operational Management Plan.*

(ii) *RC 65980 – Condition 12 (Ōhau Channel Weir – Lake Rotorua)*

ANNUAL REPORTING

By 1 June each year for the term of this consent, the consent holder shall provide a report to the Chief Executive of the Bay of Plenty Regional Council or delegate, the Rotorua Te Arawa Operational Liaison Group (RTALOLG), the Ohau ki Rotoiti Kaitiaki Group and the Okere ki Kaituna Kaitiaki Group setting out:

(a) *the actual distribution of lake levels compared to the target distribution;*

(b) *any difficulties experienced by the consent holder in achieving the target lake level ranges and minimum Okere Gate flow rates;*

(c) *a summary of any consultation undertaken with stakeholders in accordance with Conditions 10 and 11 of this consent;*

(d) *a summary of any investigations undertaken as a result of complaints about the adverse effects of the lakes;*

(e) *methods for how any difficulties in achieving target level ranges and Okere Gate minimum flows have and will be resolved and how many complaints about the adverse effects of lake levels have been responded to; and*

(f) *methods proposed to resolve any issues that may have risen including operational difficulties, water quality, and extreme weather events, and any changes required to the Operational Management Plan.*

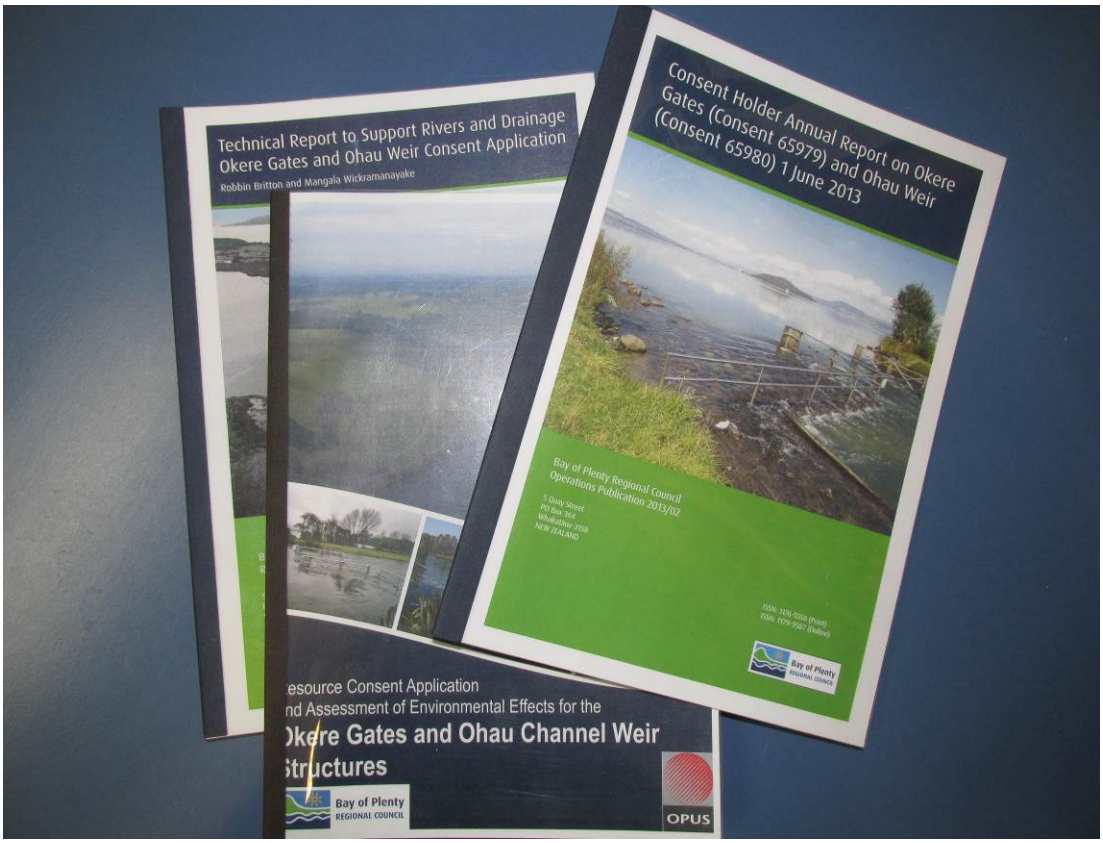

Figure 3 Various Okere Gates and Ohau Weir reports.

Part 2: Actual distribution of lake levels against target distribution

2.1 Lake Rotoiti lake level distributions

Lake level distributions are determined by Consent Number 65979 Condition 7.4(a)-(c) (Operational Limits) and are best expressed in the graphical envelope shown in Figure 4 below.

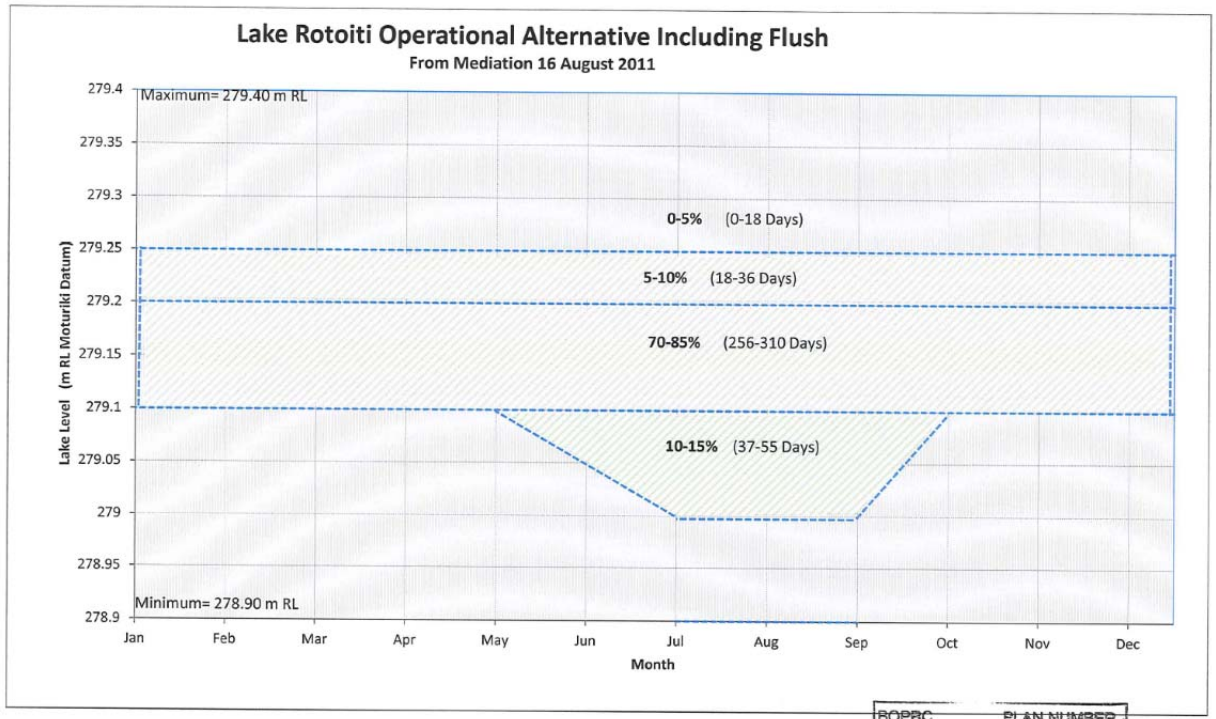

Figure: Schematic of Lake Rotoiti possible alternative operating envelopes

Figure 4 Lake Rotoiti operational envelope – target distributions.

2.2 Data collection and management

Lake levels and flow rates are assessed each morning from HydroTel (BOPRC telemetry and environmental data management software).

HydroTel data is generally recorded at 15 minute intervals and from this the 0800 hours dataset is extracted as a spot reading and recorded in an 'operational spreadsheet' along with rainfall volumes, weather conditions and general commentary. A more comprehensive dataset can be extracted from the HydroTel archive for further analysis if required.

2.3 Lake Rotoiti

Figure 5 below shows the 12 month trace of levels for Lake Rotoiti from 1 April 2014 to 31 March 2015.

Figure 5 Lake Rotoiti levels measured at Okawa Bay Marina from 1 April 2014 to 31 March 2015.

Key observations:

- The annual drawdown of Lake Rotoiti programmed between 1 May and 30 September commenced on 27 April 2014 and concluded 3 September 2014 (130 days or 36% of year). This compares to 47 days the previous year.

  This resulted from an extended period of below average rainfall (82% of normal) between January and September 2015. The summer months between January and April 2015 were particularly dry with only 58% of normal rainfall received.

  Consented time for 'drawdown allowance' is 36 to 55 days per year or 10-15% per annum.

  Note: The 'annual drawdown' occurs during the winter months to improve confidence of a lake refill following lowering of the lake.

- The ‘target’ lake level minimum of RL 279.00 m was maintained for approximately 25 days from 9 July 2014 to 3 August 2014 allowing communities opportunity to observe the effects of the lower lake level for assessment and future comment.

  However, lake levels continued to decline a further 28 mm to RL 278.972 m on the 18 July 2014 as ‘greater outflows than inflows’ were maintained to prevent reflux.

- Significant rain (70 mm) on 19 August 2014 resulted in a rapid recovery of lake levels to back inside the main operating range of RL 279.10 m to 279.20 m.

- Lake levels fell below the ‘main operating range’ of RL 279.10 m for 55 days from January 2014 to March 2015 as dry conditions persisted across the North Island.

Table 1 below summarises ‘lake level’ distributions against ‘consent target distributions’ from 1 April 2014 to 31 March 2015.

Table 1 Lake level target distributions verses actual distributions.

Consent number 65979 Okere Gates				**Actual results**		
Condition	**Range (RL m)**	**Target distribution (per calendar year)**		**Consent evaluation period 1 April 2014 to 31 March 2015**		
		days	**%**	**days**	**%**	**Variation %**
7.4(a)	279.00-279.40	365	100	344	94.3	-5.7
7.4(b)(i)	279.05-279.25	332	91	320	87.7	-2.3
7.4(b)(i)(a) Drawdown zone from 1 May to 1 October 2012	279.00-279.10	36-55	10-15	105	28.8	+18.8
7.4(b)(i)(b)	279.10-279.20	256-310	70-85	174	47.7	-22.3
7.4(b)(i)(c)	279.20-279.25	18-36	5-10	3	0.8	-4.2
7.4(c)	>279.25	18	5	0	0.0	-5.0

Figure 6 below summarizes mean lake levels on Lake Rotorua and Lake Rotoiti from 1 January 1997 to 31 March 2015. It can be shown that Lake Rotoiti levels are on average lower under the new consent (red Line) than under the old consent (green dash line) while Lake Rotorua levels are marginally higher (yellow line).

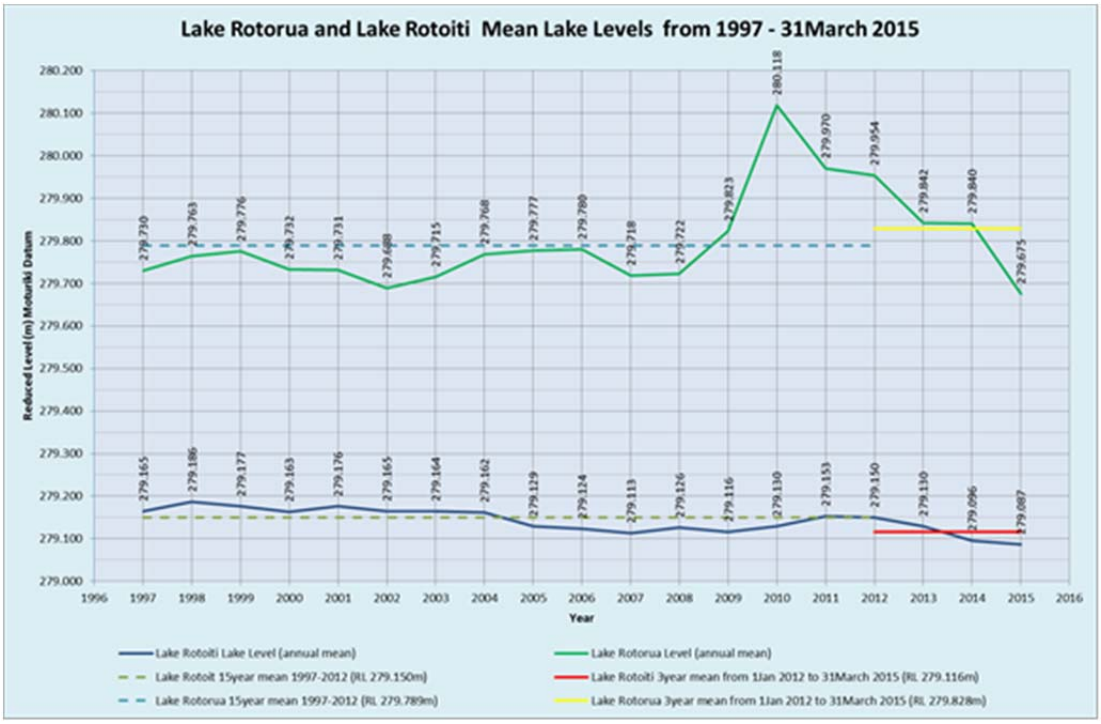

Figure 6 *Graphical summary of Lake Rotorua and Lake Rotoiti mean lake levels from 1997 to 31 March 2015.*

Figures 7 and 8 below show beach profiles at Te Rauto Bay and Hinehopu during the bottom of the drawdown phase in July 2014.

Figure 7 *Te Rauto Bay during annual drawdown – Lake level RL 278.994 m on 9 July 2014.*

Figure 8 *Hinehopu during annual drawdown – Lake level RL 278.994 m on 9 July 2014.*

2.4 Lake Rotorua

Figure 9 below shows the 12 month lake level trace for Lake Rotorua from 1 April 2014 to 31 March 2015.

Notable observations are:

- The Ohau Weir stoplogs remained in place for the entire 12 month period indicating again that Lake Rotorua levels were below average compared to four installations/removals in 2013, two in 2012, six in 2011 and two in 2010.
- The highest level recorded this term was RL 280.004 m on the 20 September 2014 or 0.072 m below the consented maximum of RL 280.076 m.
- The lowest level recorded this term was RL 279.633 m on the 15 January 2015 or 0.167 m above the consented minimum of RL 279.466 m.

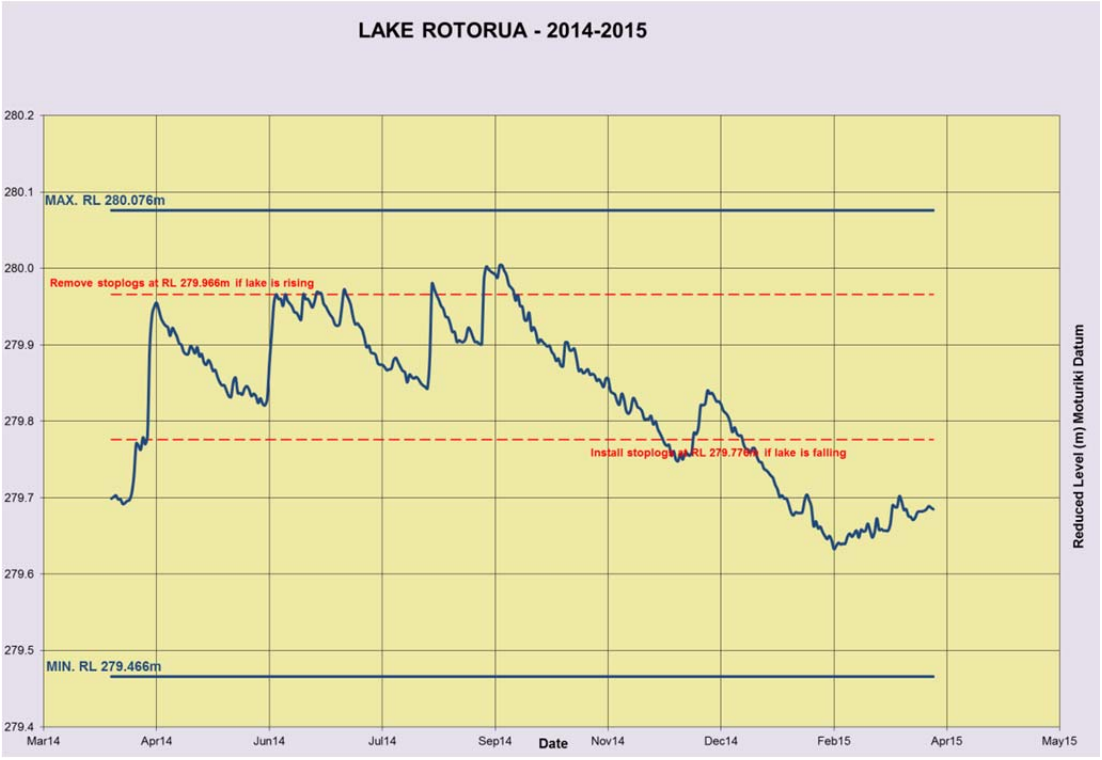

Figure 9 Lake Rotorua levels measured at Town Wharf from 1 April 2014 to 31 March 2015.

2.4.1 Discussion

For the 12 month period, Lake Rotorua levels remained below the maximum level of RL 280.076 m for 100% of the time or 365 days. In 2011 and 2012, maximum lake levels had been exceeded several times following significant rain events causing flood related issues around lake margins and the Ōhau Channel through Mourea. A photographic record along with staff gauge readings at the SH 33 Bridge is maintained to record the relationship between Lake Rotorua, Ōhau Channel and Lake Rotoiti water levels levels. This will help provide better understanding of lake level effects on Ōhau Channel levels and flows, particularly during times of flooding or high lake levels. When lake levels reached the trigger level to remove the Ohau stoplogs during Setember 2014, the stoplogs were kept in to preserve lake levels as NIWA had forecast a dry summer.

It is noted that the Ōhau Channel Weir provides minimal flood relief once maximum lake levels occur as the weir becomes drowned. The stoplogs perform best during low lake levels to decrease outflows and maintain lake levels.Ōhau Channel Weir at Lake Rotorua Outlet.

Figure 10 Removing Ōhau Weir stoplogs - 29 October 2010.

Figure 11 Ohau Channel stoplogs stored on site following refurbishment.

Part 3: Actual flow rates versus minimum flow rates

3.1 Consent number 65979 flow rate conditions

Operational limits 7.4(f) to (l) relate to flows through the Okere Gates and are specified in Consent Conditions 65979. In summary these conditions require that except under extreme droughts or an emergency:

- A minimum river flow (7.9 cumecs) with a seven day minimum of 9.84 cumecs.
- Greater outflows (Okere Gates) than inflows (Ōhau Channel) assisting to preserve water quality of Lake Rotoiti.
- Okere Gates ramping rates - closing (-5 cumecs/hour) or opening (+10 cumecs/hour) in consideration of river bank stability downstream when flows fluctuate.
- Recreational river flows for rafting and kayaking to be provided wherever possible within the other limits of the consent.

Comments on performance follow in paragraph 3.3.1 discussion notes.

3.2 Monitoring

Flow rates on the Ōhau Channel and Okere Gates are monitored by telemetry using NIWA's lake level recorder at Mission Bay on Lake Rotorua and the Taaheke River Gauge Station on the Kaituna River, located approximately 3 km downstream of the Okere Gates. Flow values are accurate to +/-8% of any given reading but for the purposes of management, the given reading at any time is recorded as the measured flow.

A consent priority is maintaining greater outflow (Okere Gates) than inflow (Ōhau Channel) to prevent reflux around the downstream end of the Ohau Diversion Wall. This measure assists in maintaining the water quality of Lake Rotoiti.

3.3 Results

Flow rates for the Ōhau Channel (inflows in blue) and Kaituna River @ Taaheke (outflows in red) as recorded at 0700 hrs each morning are shown in Figure 12 below.

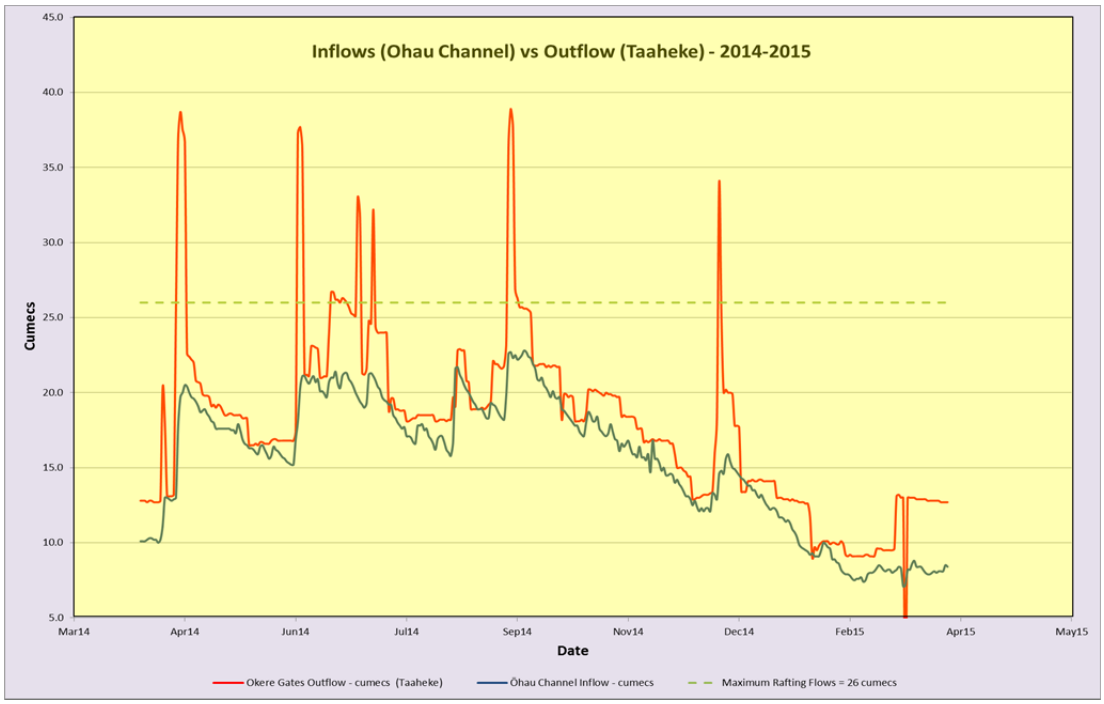

Figure 12 Lake Rotoiti inflow - Ōhau Channel (blue) and Okere Gates outflow - Kaituna River (red) - 1 April 2014 to 31 March 2015.

For interpretation of Figure 12 above, Kaituna River outflows (in red) are required to be higher than Ōhau Channel inflows (in blue) to satisfy the water quality equation – outflows are greater than inflows.

For a more comprehensive analysis to assess the six-hourly and seven-day flow averages, refer to Figure 13 below. These results have been summarized in Table 2.

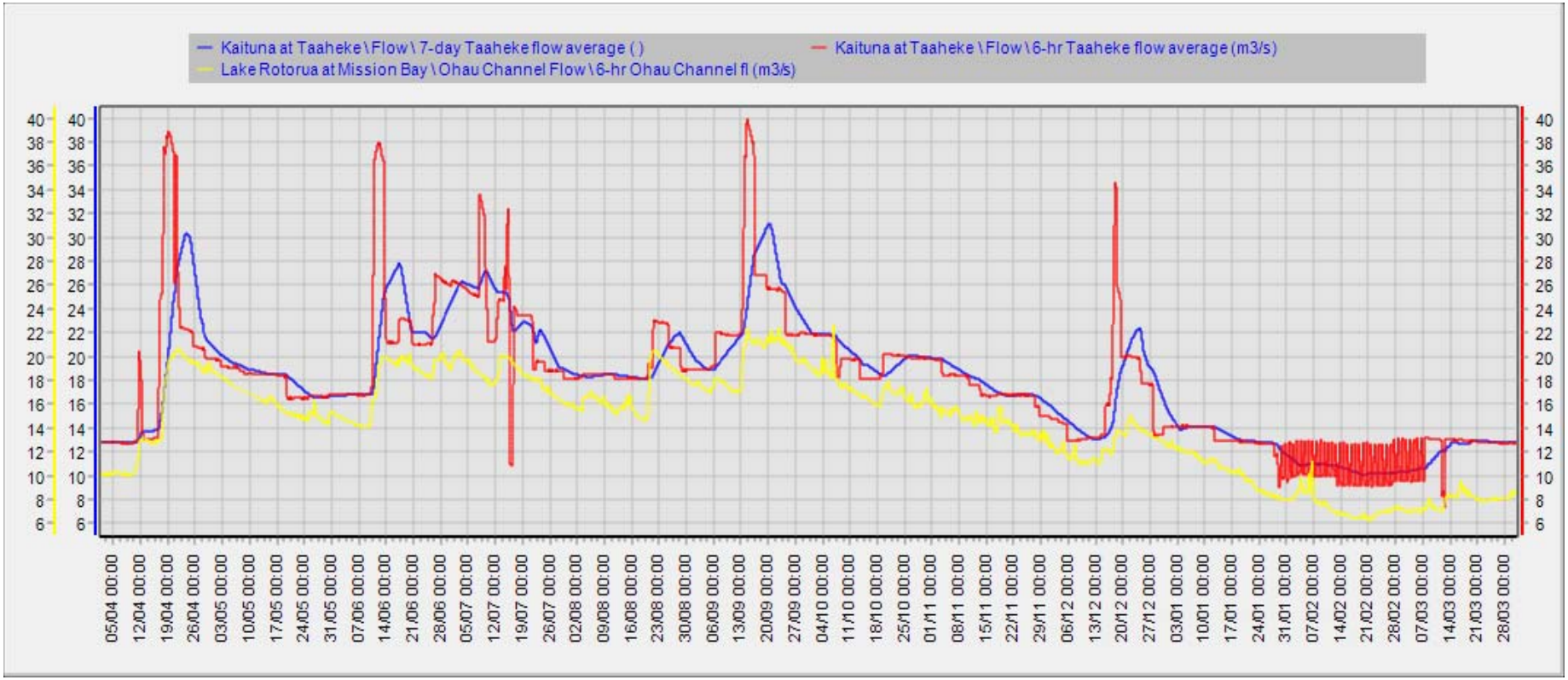

Figure 13 HydroTel summary of Ōhau Channel and Kaituna River flow rates – six-hourly and seven-day averages.

Table 2 Okere Gate flow distributions from 1 April 2014 to 31 March 2015.

Consent #65979 Okere Gates			Results		Variation from requirement	
Condition	**Flow requirement** (m^3/s)	**Target distribution** (per calendar year)	**Consent evaluation period** 1 April 2013 to 31 March 2014			
			Days	**%**	**Incident date**	**Comment**
7.4(f)(i)	Six-hourly average flow of 7.9 m^3/s. (Figure 13 – blue trace)	100%	364	99.7	11-12 March 2015	Emergency 'full' closure of Okere Gates to facilitate Police Search and Rescue Operation – River flows near zero cumecs.
7.4(f)(ii)	Seven day rolling average flow of 9.84 m^3/s. (Figure 13 – red trace)	100%	365	100	None	Minimum flow recorded =10.1cumecs on 19 February 2015
7.4(i)	Six-hourly average outflow through gates >six-hourly average inflow from Ōhau Channel. (Figure 13 – Yellow trace)	100%	364	99.7	11-12 March 2015	Emergency closure of Okere Gates River flows near zero cumecs therefore less than Ōhau Channel inflows therefore creating a 'reflux' situation.
7.4(j)(i).	When opening the gates, a maximum flow increment of 10 m^3/s per hour.	100%	365	100	None	Gates were opened and closed in accordance to consent conditions – all operations are recorded in daily operating spreadsheet.
7.4(j)(ii)(a)	When closing the gates, a maximum flow decrement of 5 m^3/s per hour when operating the Okere Gates below 30 m^3/s.	100%	365	100	None	Gates were opened and closed in accordance to consent conditions – all operations are recorded in daily operating spreadsheet.
7.4(j)(ii)(b)	A maximum flow decrement of 10 m^3/s per hour when operating the Okere Gates at or above 30 m^3/s.	100%	365	100	None	Gates were opened and closed in accordance to consent conditions – all operations are recorded in daily operating spreadsheet.

3.3.1 Discussion

Okere Gate minimum flow rates usually occur during the summer months when rainfall, inflows and lake levels are low.

The minimum Kaituna River/Okere Gate flow for this reporting period was 9.0 cumecs recorded on 29 January 2015 compared to 8.6 cumecs on 8 March 2014 in the previous year. The minimum allowable flow is 7.9 cumecs.

The minimum Ōhau Channel flow for this reporting period was 6.2 cumecs recorded on 29 January based on NIWA's rating curve for the lake level recorder at Mission Bay (accuracy 8%).

The Kaituna River seven-day minimum flow was 10.1 cumecs on 19 February 2015 while the Ōhau Channel seven day minimum flow was 6.6 cumecs on 25 February 2015 (extracted from the HydroTel record).

Okere Gates outflows were greater than Ōhau Channel inflows for 100% of the time except for a few hours each day (11-12 March 2015) while the Kaituna River was lowered during the police search and rescue operation. This allowance is covered in Condition 7.4.(g) stating:

"Flows may only drop below the flow rates specified in Condition 7.4 (f) in extreme droughts or when the Okere Gates are closed as a result of an emergency."

Okere Gate ramping increments (change in flow rate per hour) were maintained 100% of the time as gates were adjusted in transitional stages (10 cumecs/hour when opening and 5 cumecs/hour when closing). This data is recorded in the daily operational spreadsheet and logbook.

Recreational flows – Kaituna River:

- A requirement of Consent Condition 7.4(l) is to facilitate recreational flows for Kaituna River activities where ever practical.
- Rafting flows are achieved inside the 13-26 cumec range or at gate settings of 3 at 200 and 3 at 500 respectively. These 'commercial' flows have been determined by Maritime New Zealand. When Ōhau Channel inflows exceed 26 cumecs, rafting will cease on the Kaituna River as a greater flow is released through the Okere Gates (outflow>inflow).
- Every reasonable effort is made to accommodate rafting flows while maintaining consent conditions. Communications are regularly maintained to advise and assist the rafting community with planning and cancellations.
- For this reporting period, there were 357 rafting days (97.8% of year). This compares with 96.4% the previous year (2013) and 80.3% in 2012.

Figure 14 Kaituna River 'low flows' below the Okere Gates – 12 March 2015.

Figure 15 Ohau Diversion Wall directing Ōhau Channel flows to Okere Gates – 21 May 2014.

Part 4: Operational difficulties

4.1 Discussion

Operationally, there were no significant difficulties to report this term.

During the Police Search and Rescue Operation in March 2015, there was a minor technical issue with the Remote Okere Gates Control System site but this was quickly remedied without compromising consent conditions.

The main Okere Gates Control System was fully upgraded in February 2013 improving control and communications to and from the site. The steel lifting ropes and connections on each gate were also replaced during this time. The new system has been operating well since the upgrade.

There were no Ōhau Channel stoplog operations this term as Lake Rotorua levels remained relatively low for the 12 month reporting period. The Ōhau Channel stoplogs were last installed November 2013 and have been in place since.

The challenge each year is staying within prescribed consent ranges and limits during times of climatic extremes. This year was particularly challenging after below average rainfall for many months resulting in low lake levels for extended periods. During periods of dry weather or drought, the challenge is maintaining lake levels as the consent balances water quality against water quantity when ensuring outflows (Okere Gates) are greater than inflows (Ohau Channel).

Again, lake levels are proactively managed using long-range forecasts to manage lake levels early without compromising consent conditions.

Part 5: Consultation with stakeholders

5.1 Background – establishment of liaison and Kaitiaki groups

Under the conditions of these consents, the Consent Holder was initially tasked with facilitating the establishment of a liaison group and two Kaitiaki groups within three months of the commencement of the consent. The purpose of the groups is to essentially facilitate discussion and free flow of information between the consent holder and the community.

These groups are:

- Rotorua Te Arawa Lakes Operational Liaison Group (RTALOLG).
- Ohau ki Rotoiti Kaitiaki Group (OKRKG).
- Okere ki Kaituna Kaitiaki Group (OKKKG).

For this term, groups held their 2014 Annual General Meetings on:

- RTALOLG 9 September 2014
- Ohau ki Rotoiti Kaitiaki Group 22 August 2014
- Okere ki Kaituna Kaitiaki Group 12 September 2014

BOPRC facilitated these meetings and presented the 2013/2014 Okere/ Ohau Annual Report. Meeting minutes were recorded and are available to group members.

The RTALOLG Group elected Phil Thomas as the new Chair after Andy Bruere stepped down following two years as the inaugural Chair.

Annual reports are circulated to the chairs of the liaison and Kaitiaki groups for distribution to its members.

The Consent Holder is required to convene a meeting each year with the two Kaitiaki groups and with the RTALOLG at least annually in the first three years and thereafter at least every third year.

5.2 Community communication

Every effort has been made to maintain regular communication with all stakeholders.

This communication includes:

- BOPRC flood managers – Lake level and flow conditions.
- Iwi – Response to inquiries and establishment of Kaitiaki groups.
- Residents – Response to enquiries.
- Rafters – Gate settings and river flows.
- NIWA – Advise NIWA on Ohau Wier stoplog operations.
- Rotorua tourism operators – Lake front issues.
- Media – Situation reports.

Part 6: Complaints and investigations

6.1 Complaint summary – 1 April 2014 to 31 March 2015

Seven complaints were received this term, they were:

Date	By	Concern	Action	Result
23/01/2015	M Gill (Okawa Bay)	Low Lake Levels	Explained circumstances and recommended Mr Gill to follow-up with Regional Council's Regulatory Arm Regular communications with Okere group maintained and media releases issued.	Regional Council's Regulatory Arm informed but no follow-up by Mr Gill.
24/01/2015	"	"	"	"
25/01/2015	"	"	"	"
26/01/2015	"	"	"	"
26/01/2015	"	"	"	"
28/01/2015	"	"	"	"
30/01/2015	"	"	"	"

Concerns:

Typical concerns expressed varied from:

- Low lake levels and boat access to jetties.
- Perceived reflux around the Ohau Diversion Wall.

Stakeholder concerns were responded to quickly with a full explanation of the issue in terms of consent conditions and the Operational Management Plan.

The Consent Holder posts regular updates to the '@Okere Gates-Kaituna River Rafting' Group advising on:

- Lake level conditions.
- Okere Gate settings.
- Met Service forecasts and warnings.
- Programmed activities.

There were no flood issues reported for this 12 month period.

6.2 Investigations and monitoring

Investigations completed or currently underway to meet conditions of the consents are shown in Table 3 below:

Table 3 Investigations and monitoring completed or in progress.

Investigation	Consent 65979 Condition No.	Location	Issue	Progress
Flood mitigation and beach vegetation	12	Mourea/Ōhau Channel Hinehopu and Te Rauto Bay	Flooding Narrow beaches	12.1 Flap gate installed on stormwater outlet at Takinga Street on 5 June 2015. 12.2 Bunding no longer required as ground levels now meet design criteria. Recommendation currently before Regional Council's Regulatory Arm to 'cancel' this condition. 12.3 Apply herbicide to Hinehopu and Te Rauto beaches. Recommendation before Regional Council's Regulatory Arm to 'place this condition on hold' as Ohau ki Rotoiti Kaitiaki Group reject this mitigation measure. Continue to monitor beaches as item likely to be addressed in their Cultural Management Plan due in January 2016.
Velocity monitoring	13.2	Ōhau Channel	Maintain fish migration during flush (Fish & Game New Zealand)	Report completed by BOPRC - EDS Section July and October 2014. Submitted to Regional Council's Regulatory Arm and Fish & Game New Zealand, 8 October 2014. Ongoing each year until revised.
Hinehopu investigation	14	Hinehopu/ Tamatea Street	High groundwater causing flooding	Field tests completed September 2013. Three reports completed and results currently before the Regional Council's Regulatory Arm for review. When reviewed, stakeholder meetings shall be convened to discuss outcomes.
Lake level/ staff gauge monitoring and settlement	8	Hinehopu, Gisborne Point Okawa Bay Te Akau Bay	Monitor settlement	Ongoing. Lake staff gauges read monthly and record maintained to calibrate against Okawa Bay Recorder Tower.

6.2.1 Condition 14 - Hinehopu water table monitoring - Tamatea Street

Consent Condition 14 states that the consent holder is tasked to investigate the correlation between lake levels and adverse ground water levels for a 12 month period within three months of the new consent being issued.

More than three years of monitoring is now complete following initial pre-consent and then post consent investigations.

Those investigations sort to establish whether:

- There is a correlation between lake levels and Hinehopu groundwater levels.
- Are lake levels higher under the new consent?
- If lake levels are higher, develop a recommended Programme of Works designed to mitigate any adverse effects of the elevated lake levels.

Three reports have now been submitted to the Regional Council's Regulatory Arm for review and once completed; outcomes will be reported to Hinehopu stakeholders.

6.2.2 Condition 13.2 - Ohau Channel cross sections and velocity monitoring

Ōhau Channel cross sections are undertaken annually at locations shown in Figure 16 to monitor bed levels prior to and after channel flush each year.

Figure 16 Ohau Channel cross section locations.

Several years of survey monitoring indicate that the Ōhau Channel is reasonably stable with no significant changes occurring since introducing the annual Flush Programme in 2012.

It appears that the normal processes of erosion and aggradation are occurring naturally within the Ohau Channel regardless of the flush but further monitoring will confirm this observation. Data analysis indicates a generally stable environment with only minor changes occurring through the Ōhau Channel reach.

One purpose of the lake level drawdown or flush is to potentially increase channel velocities to mobilize sediments to increase capacity therefore reducing flood risk.

At this stage, this remains the best approach to potentially mobilize bed load and maintain sufficient gradient in the Ōhau Channel.

Figure 17 below shows an example of cross section 75/34 located downstream of State Highway 33 at Te Takinga Marae.

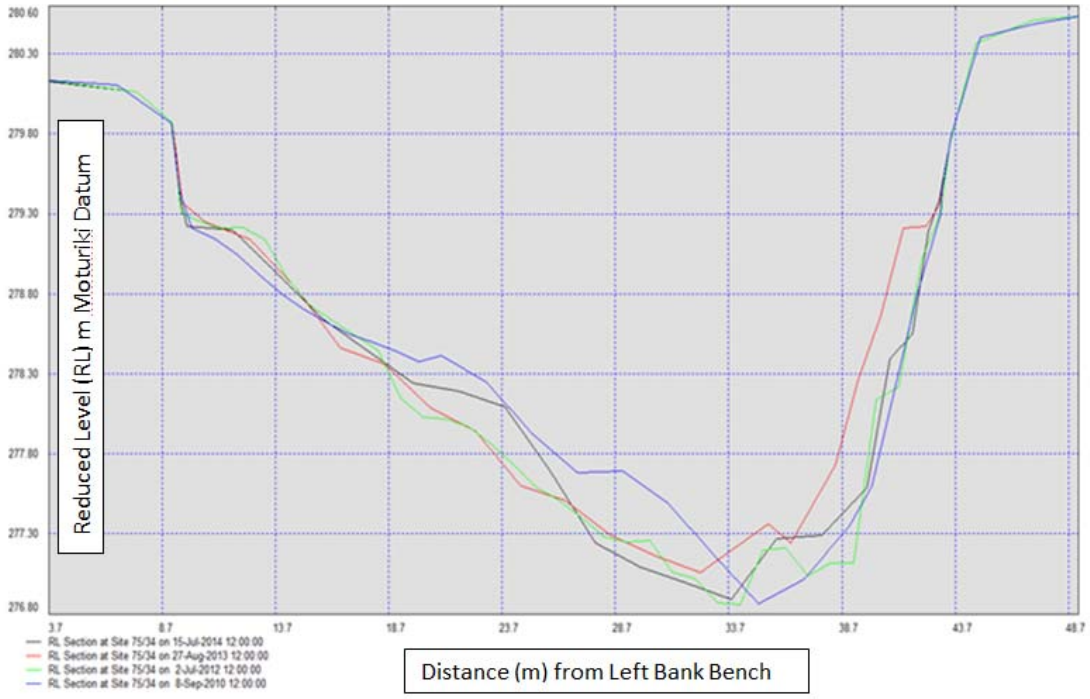

Figure 17 Cross section number 75/34 at Marae – 2010–2014.

In July 2012, a new staff gauge was fitted to the Ōhau Channel/ State Highway 33 Bridge (Figure 18) to monitor the relationship between Lake Rotorua, Ōhau Channel and Lake Rotoiti water levels.

Following three years of monitoring, it appears that the dominant influences on Ōhau Channel water levels are Lake Rotorua levels. This trend was particularly evident during the 2014 drawdown phase when Lake Rotorua and Ōhau Channel levels remained high while Lake Rotoiti was drawn down to its consented minimum of RL 278.994 m on 9 July 2014.

Figure 18 Ōhau Channel Staff Gauge on State Highway 33 Bridge – Mourea.

6.2.3 Velocity monitoring

Annual monitoring is required under Condition 13.2 to address concerns by Fish & Game New Zealand to determine any effects the flush may have on Ōhau Channel velocities and fish migration.

Velocity measurements at several locations were conducted during the drawdown phase in July 2014 and repeated in October 2014 after lake levels were restored to normal levels.

The monitoring concluded no significant change in velocities during the flush and reports submitted to Fish & Game New Zealand.

This monitoring will continue annually or until reviewed if conclusions remain unchanged.

6.2.4 Ohau Diversion Wall - reflux monitoring

Velocity monitoring work was carried out in October 2012 by BOPRC using an Acoustic Doppler Current Profiler (ADCP), to measure reflux currents at the Ohau Diversion Wall after the Okere Gates were closed down to less than Ōhau Channel inflows.

This followed concerns from the rafting industry that the high flows through the Okere Gates (outflows greater than inflows) were preventing commercial rafting opportunity on the Kaituna River and reflux should be monitored for assessment and better understanding.

The results of this monitoring were inconclusive due to wind and wave action on the day, but initial indications suggested a negligible effect for these test conditions.

It is proposed to carry out further 'reflux' monitoring and this will be reported on in future reports and may supplement the work coming out of the Rotorua Lakes Programme.

No reflux velocity measurements were undertaken during this reporting period.

Figure 19 BOPRC EDS staff measuring lake currents near the Ohau Channel Diversion Wall at Te Akau Bay – Lake Rotoiti (October 2012).

Part 7: Conclusion

Consents 65979 and 65980 have now been operational for over three years since the issue of the renewed consents in March 2012.

The biggest driver for Lake Rotoiti level management is water quality followed by water levels. The operational regime of these consents compliments the Rotorua Lakes Programme to improve water quality in Lake Rotoiti by ensuring outflows through the Okere Gates (Kaituna River) are always greater than inflows from the Ōhau Channel (Lake Rotorua).

Various monitoring programmes continue around the lakes and Ōhau Channel and provide valuable information for both Consent Holder and stakeholders in understanding lake dynamics and environmental effects.

Investigations at Hinehopu and Mourea are complete and reports are currently before the Regional Council's Regulatory Arm for review. Once completed, meetings will be convened to advise stakeholder on outcomes.

Currently, there are two recommendations before the Regional Council's Regulatory Arm to cancel Condition 12.2 (bunding) and place on hold 12.3 (herbicide on beaches).

The Consent Holder endeavours to maintain frequent communications and maintain the free flow of information with consent stakeholders at all times.

2014/2015 has been a challenging year in terms of environmental conditions to maintain lake levels and flow rates when lake levels are at their minimum. The Consent Holder has responded to complaints and concerns quickly and assured complainants no conditions have been compromised.

The Annual General Meeting between the Consent Holder, RTALOLG and the two Kaitiaki groups is a good opportunity to present the annual report and discuss any lake environment issues.

The Consent Holder (Technical Services Group) also acknowledges the Regional Council's Regulatory Arm to ensure both consents are managed in accordance with all 76 consent conditions.

The Consent Holder deems that it has generally fulfilled its management and operational obligations for the 2014/2015 consent period as recorded in this annual report.