Consent Holder Annual Report on Okere Gates and Ohau Weir

Bay of Plenty Regional Council
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5 Quay Street
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NEW ZEALAND

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REGIONAL COUNCIL

Consent Holder Annual Report on Okere Gates (Consent 65979) and Ohau Weir (Consent 65980) – 1 June 2014

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Cover photo: Ohau Weir – Removing stop logs
27 May 2013

Acknowledgements

Bay of Plenty Regional Council's (BOPRC's) Survey and Environmental Data Services 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.

Executive summary

As consent holder, Bay of Plenty Regional Council's 'Natural Hazards Group' is required to submit an annual report 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.

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.

This report will cover the 12 months of operations from 1 April 2013 to 31 March 2014.

For the 12 month period above, lake levels and flow rates were held within consent operating envelopes except for a time from January to March 2014 when lake levels were low following summer drought conditions. The consent considers the effects of these extreme environmental conditions (both wet and dry) and has established guidelines in place to manage lake levels accordingly.

Good 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.

This report discusses:

- 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.

Contents

Tables and figures

Part 1: Introduction

1.1 Background

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, 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.

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

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

The Okere Gates structure, constructed in 1982, 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 Rotoiti or Lake Rotorua (apart from the natural rock ledge), with the result that lake levels fluctuated considerably with rainfall, inflow and climate. 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.

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.

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 1 below.

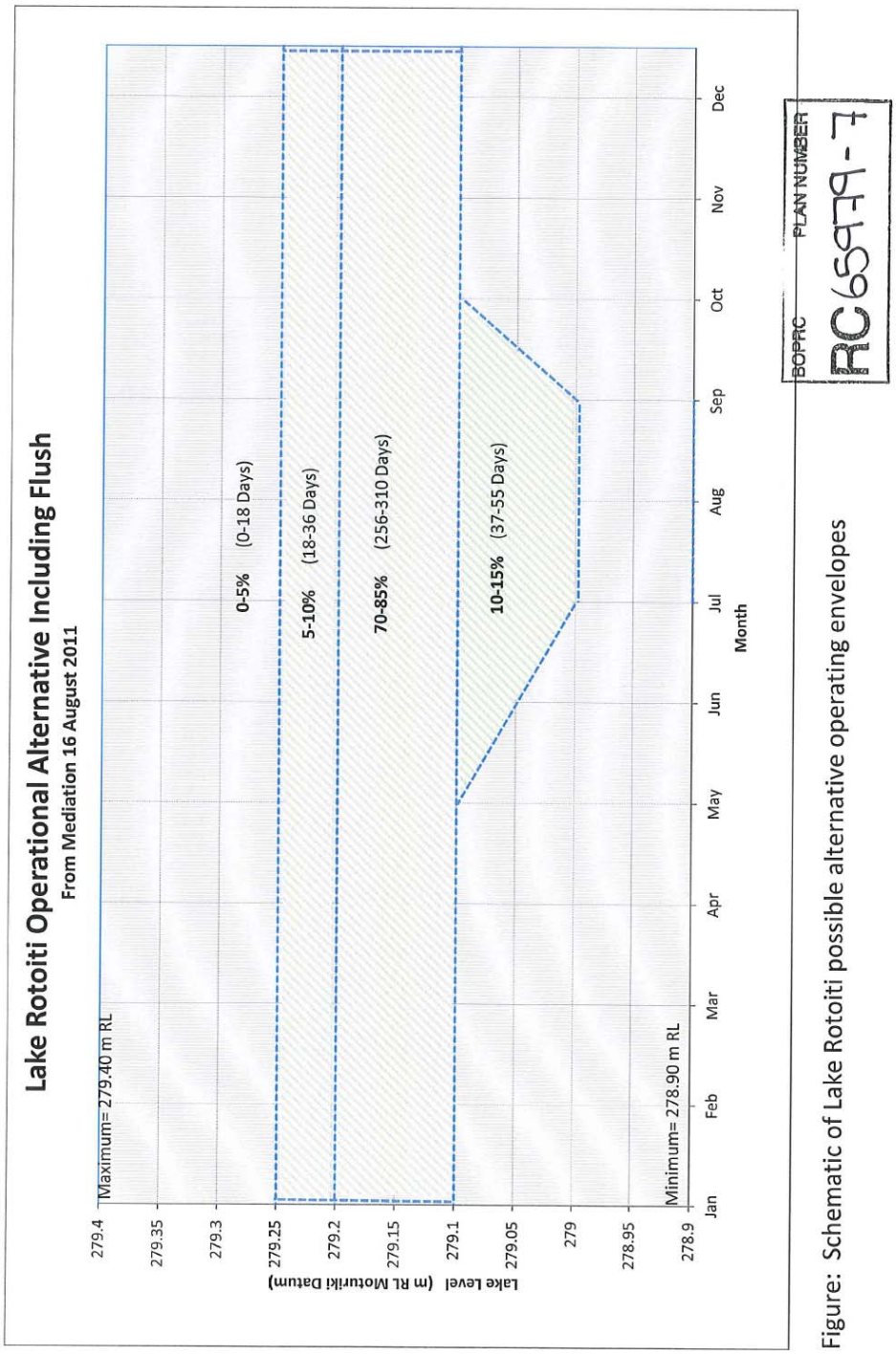

Figure: Schematic of Lake Rotoiti possible alternative operating envelopes

Figure 1 Lake Rotoiti operational envelope – target distributions.

2.2 Data collection and management

Lake levels and flow rates are interrogated each morning from HydroTel - (BOPRC telemetry and 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 if required.

Lake Rotoiti

Figure 2 below shows the 12 month trace of levels for Lake Rotoiti from 1 April 2013 to 31 March 2014.

Key observations:

- The annual drawdown of Lake Rotoiti programmed between 1 May and 30 September commenced on 8 July 2013 and concluded 21 August 2013 (45 days or 12% of year). Consented time allowance is 36 to 55 days per year or 10-15% per annum.
- The 'target' lake level minimum of RL 279.00 m was maintained for 30 days from 15 July 2014 to 15 August 2014 following low rainfall for this period. This window of time allowed communities opportunity to observe the effects of the lower lake level for assessment and future consideration.
- Significant rain in the final week of 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 44 days from January 2014 to March 2014 as drought conditions persisted across the North Island.

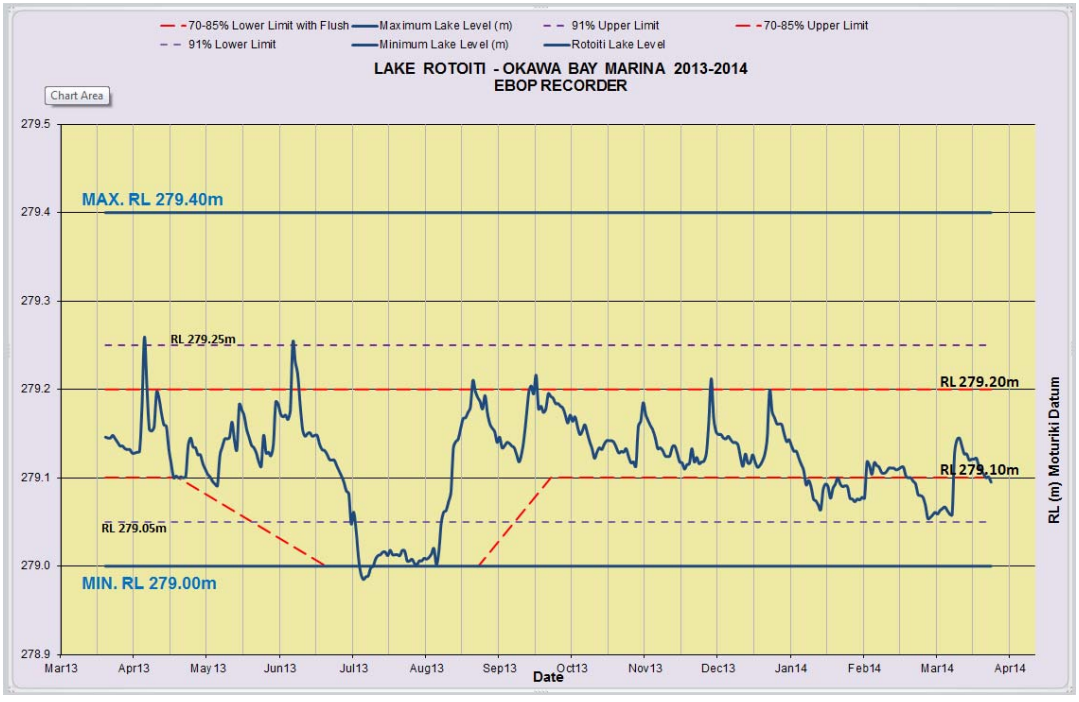

Figure 2 Lake Rotoiti levels measured at Okawa Bay Marina from 1 April 2013 to 31 March 2014.

Table 1 below shows the distributions against the consent target distributions.

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 2013 to 31 March 2014	
		days	%	days	%
7.4(a)	279.00-279.40	365	100	360	98.1
7.4(b)(i)	279.05-279.25	332	91	328	89.9
7.4(b)(i)(a) Drawdown zone from 1 May to 1 October 2012	279.00-279.10	36-55	10-15	45	12.3
7.4(b)(i)(b)	279.10-279.20	256-310	70-85	266	72.9
7.4(b)(i)(c)	279.20-279.25	18-36	5-10	9	2.5
7.4(c)	>279.25	18	5	2	0.5

2.2.1 Discussion

Lake level distributions over the various ranges were generally on target with a satisfactory result of 72.9% in the 'main operating range' of RL 279.10 m to 279.20 m. Target distribution for this range is 70-85%. There were only five occurrences or 11 days for this 12 month period when lake levels exceeded RL 279.20 m.

For the wider range from RL 279.05 m to 279.25 m, distribution totals were 89.9% compared to a target distribution of 91%.

The drawdown of Lake Rotoiti (<RL 279.10 m) commenced on 8 July 2013 and concluded 21 August 2013 (45 days or 12.3% of 365 days). Target distribution for the drawdown period is 10-15%.

There were five days during the bottom of the 'annual flush' when lake levels 'dipped' a few millimetres below the recognised minimum level of RL 279.00 m following continued low rainfall and inflows. However, for all practical purposes, it is deemed that Lake Rotoiti levels were successfully controlled within the minimum and maximum levels set out in Condition 7.4(a) of the consent.

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

2.3 Lake Rotorua

Figure 3 below shows the 12 month lake level trace for Lake Rotorua from 1 April 2013 to 31 March 2014.

Notable observations are:

- Four stop log operations during the 12 month period to store/release lake water in response falling or rising lake levels.
- Lake levels did not exceed the maximum level of RL 280.076 m.
- Lake levels did not drop below the minimum level of RL 279.466 m.

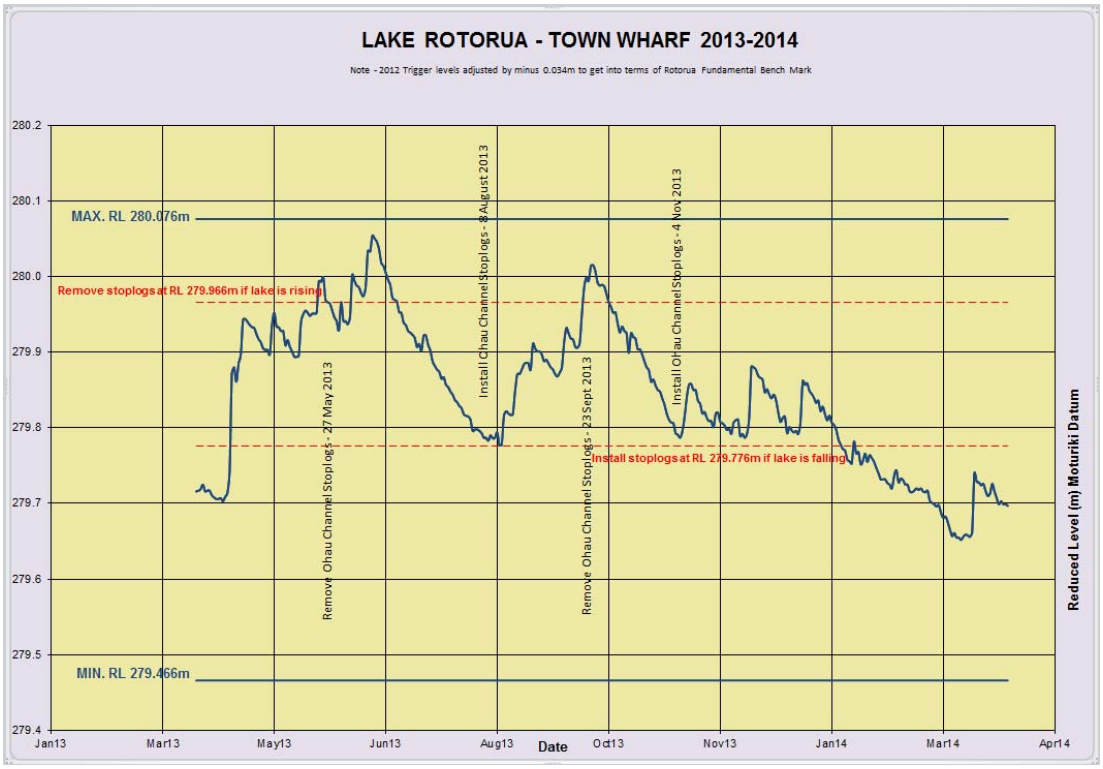

Figure 3 Lake Rotorua levels measured at Town Wharf from 1 April 2013 to 31 March 2014.

2.3.1 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 the previous two years, maximum lake levels had been exceeded several times following significant rain events causing flood related issues around lake margins and down the Ōhau Channel through Mourea. A photographic record is now maintained to monitor the relationship of Ōhau Channel levels between Lake Rotorua and Lake Rotoiti for future assessment.

The winter months between June 2013 and September 2013 were particularly dry following below average rainfall for this time of year. It was unusual to see the stop logs installed during the middle of winter when typically, they are removed.

It is noted that the Ōhau Channel Weir provides minimal flood relief once maximum lake levels occur as the weir becomes drowned. The stop logs perform best during low lake levels to decrease outflows to maintain lake levels.

Ōhau Channel Weir site photos

Figure 4 Removing Ōhau Weir stop logs - 27 May 2013.

Figures 5 & 6 Following removal, the stop logs were found to be corroded and encrusted with barnacle growth prompting early maintenance to clean, repaint and replace all fittings.

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.

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 at Taaheke and Ohau Channel are shown in Figure 6 below.

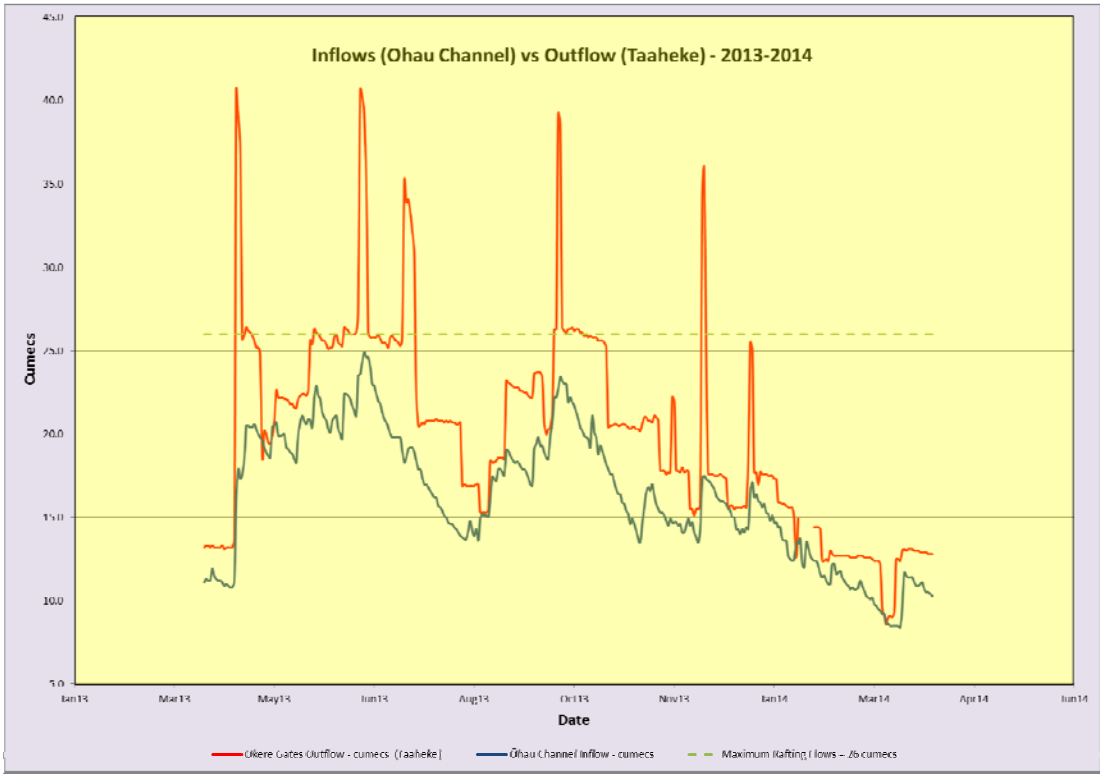

Figure 6 Lake Rotoiti inflow - Ōhau Channel (blue) and Okere Gates outflow - Kaituna River (red) - 1 April 2012 to 31 March 2013.

See Table 2 for performance summary of flow and Okere Gate ramping rates for the consent period 1 April 2013 to 31 March 2014.

Table 2 Okere Gate flow distributions from 1 April 2013 to 31 March 2014.

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)	6 hourly average flow of 7.9 m^3/s.	100%	365	100	None	
7.4(f)(ii)	7 day rolling average flow of 9.84 m^3/s.	100%	365	100	None	
7.4(i)	6 hourly average outflow through gates >6 hourly average inflow from Ōhau Channel.	100%	365	100	None	
7.4(j)(i).	When opening the gates, a maximum flow increment of10 m^3/s per hour.	100%	365	100	None	
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	
7.4(j)(ii)(b)	A maximum flow decrement of 10 m^3/s per hour when operating the Okere Gates at or above 30m^3/s.	100%	365	100	None	

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 8.6 cumecs recorded on 8 March 2014. The minimum allowable flow is 7.9 cumecs. Ōhau Channel inflows during this time were also low at 8.4 cumecs based on NIWA's lake level recorder at Mission Bay (accuracy 8%).

The Kaituna River seven-day minimum flow was 9.982 cumecs while the Ōhau Channel seven-day minimum flow was 8.472 cumecs (extracted from the HydroTel record).

Okere Gates outflows were greater than Ōhau Channel inflows for 100% of the time except for an hour on 8 March 2014 when Ōhau Channel inflow exceeded Okere Gate outflow by 0.1 cumecs after the gates were adjusted down in order to preserve lake levels. The gates were immediately adjusted once updates were received to then restore the outflow>inflow equation.

Note: Ōhau Channel flow estimate is accurate to within 8% therefore absolute values cannot be relied upon for absolute variations. It was also observed on this day that water clarity in Lake Rotorua was particularly good and any effect in Lake Rotoiti was likely to have been negligible.

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).

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 @ 200 and 3 @ 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.
- The 2013 World Rafting Championships were successfully held on the Kaituna River in November 2013 following a lake management regime to monitor, regulate and provide suitable flows for this event. This followed a programme of early communication between organizers and the Consent Holder to facilitate this event.
- For this reporting period, there were 352 rafting days (96.4% of year). This compares to 293 rafting days the previous year or 80.3%. That year was considerably wetter with high Lake Rotorua levels resulting in high flows down the Ōhau Channel. These high flows continue through the Okere Gates and consequently close commercial rafting on the Kaituna River.

Part 4: Operational difficulties

4.1 Discussion

Operationally, there were no difficulties to report for this reporting period.

Consent conditions for both structures are prescribed and specific. Diligent monitoring is maintained 24/7 to ensure consent conditions are satisfied to maintain prescribed lake levels and flow rates.

Ohau Weir operations require the installation or removal of the stop logs at specified Rotorua lake levels. These levels have been added to the BOPRC flood pager as a backup alerting the flood manager and operator as they occur.

At times there were minor technical issues with the Okere Gates power supply and electronic communication following lightning but these were quickly remedied without serious loss of control or 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.

The challenge each year is staying within the consent ranges and limits during times of climatic extremes. Lake level distributions were easily achieved this year through diligent gate operations and by releasing or storing lake water to maintain percent ranges in response to weather forecasts. Consent conditions provide sufficient flexibility to allow ‘operator discretion’ to pre-empt stoplog operations and gate settings to best manage drought or extreme rain events and therefore seek the desired outcomes.

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).

These groups have now been established with inaugural meetings held as follows:

- RTALOLG 8 June 2012.
- Ohau Ki Rotoiti Kaitiaki Group 7 August 2012.
- Okere Ki Kaituna Kaitiaki Group 29 August 2012.

Each group has elected a chairperson and are in the process of developing or have completed their respective Terms of Reference. The meetings have been tape-recorded and the notes of the meetings completed. These are available on request.

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 – Review and adjust flow rating curves.
- Rotorua tourism operators – Lake front issues.
- Media – Situation reports.

This annual report is circulated to the chairs of the Liaison and Kaitiaki Groups for distribution to its members. The chair of each group sets up communication meetings with the consent holder to speak to the annual report when requested.

Part 6: Complaints and investigations

6.1 Complaint summary – 1 April 2013 to 31 March 2014

No complaints were received by BOPRC's Compliance Section.

Concerns:

There were only minor concerns received this reporting period as lake levels were generally held within their operating ranges.

Typical concerns expressed varied from:

- Low lake levels and boat access to jetties.
- Perceived reflux around the Ohau diversion wall.
- Bias management of Okere Gates to provide rafting flows.
- Loss of rafting to high river flows.

All concerns were addressed and explained each time with reference to consent conditions and the Operational Management Plan.

Of note, there were no flood issues reported for this twelve month period.

Therefore, total number of consent complaints = 0.

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 condition No. 65979	Location	Issue	Progress
Flood monitoring.	12	Mourea/Ōhau Channel.	Flooding.	In progress. Mitigation measures on hold until further research gathered. Maintaining regular photo commentary to reference Ōhau Channel levels against neighbouring lake levels.
Velocity monitoring.	13.2	Ōhau Channel.	Maintain fish migration during flush (Fish & Game New Zealand).	Report completed by BOPRC - EDS Section July and October 2013. Submitted to Consent Authority and Fish & Game New Zealand. Ongoing each year until advised.
Water table monitoring.	14	Hinehopu.	Flooding.	Field tests completed September 2013. Conclusions currently with BOPRC management to determine consent holder responsibilities and mitigation measures if any.
Beach width monitoring. Application of herbicide.	12.3	Hinehopu. Te Ruato Bay. Lake Rotorua at Ohau Weir.	Narrow beaches. Inundation by vegetation and grasses.	Ongoing. No granting of permission from Ohau Ki Rotoiti Kaitiaki to apply herbicide. Monitoring continues.
Lake level/staff gauge monitoring and settlement.	8	Hinehopu. Gisborne Pt. Okawa Bay. Te Akau Bay.	Monitor settlement.	Ongoing. Lake staff gauges read monthly and record maintained to calibrate against Okawa Bay Recorder Tower.
Ōhau Channel Delta.	n/a	Lake Rotoiti.	Aggradation/ flooding and safe ship navigation.	Survey completed February 2013, design and estimates completed to dredge outlet as/when required.

6.2.1 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 two years of monitoring is now complete following initial pre-consent and then post consent investigations. Earlier monitoring suggested a 'soft' link between lake level and ground water levels along the rear of Tamatea Street sections but results were considered inconclusive without further monitoring.

The 'post consent' monitoring was completed September 2013 with provisional results reinforcing initial conclusions that the hydraulic link between Lake Rotoiti levels and Tamatea Street groundwater levels is minor. The dominant influence is the elevated water levels in the adjacent wetland and accompanying drain along the rear of Tamatea Street properties.

The drain is blocked in places and heavily congested with weed and vegetation. Free flowing drainage has been compromised resulting in prolonged elevated water levels, particularly after heavy rains. This resultant elevation in the wetland surface and groundwater levels is understood to be the dominant influence on high groundwater tables along Tamatea Street and not lake levels.

Lake Rotoiti levels can be returned to normal operating ranges relatively quickly following heavy rains by fully opening the Okere Gates.

The Okere Gate consent conditions have a less than minor effect on Tamatea Street ground water levels.

It is therefore recommended that this finding be presented to the various stake holder groups and communities to seek resolution to Consent Condition 65979, Condition 14.

It is noted that the wetland and accompanying drain are managed by Department of Conservation and Crown.

6.2.2 Ohau Channel cross sections and velocity monitoring

Ōhau Channel cross sections are undertaken annually at locations shown in Figure 7 to monitor bed levels prior to and after channel flush each year.

Figure 7 Ohau Channel cross section locations.

Several years of survey data collection indicate that the Ōhau Channel is reasonably stable with no significant change 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.

Figure 8 shows a typical 'pre-flush' channel cross section on 10 May 2013 for site 25B below the State Highway 33 Bridge (black) followed by a post flush cross section on 26 August 2013 (red).

The intent of the lake level drawdown or flush is to potentially increase channel velocities to mobilize sediments to increase capacity therefor reducing flood risk.

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

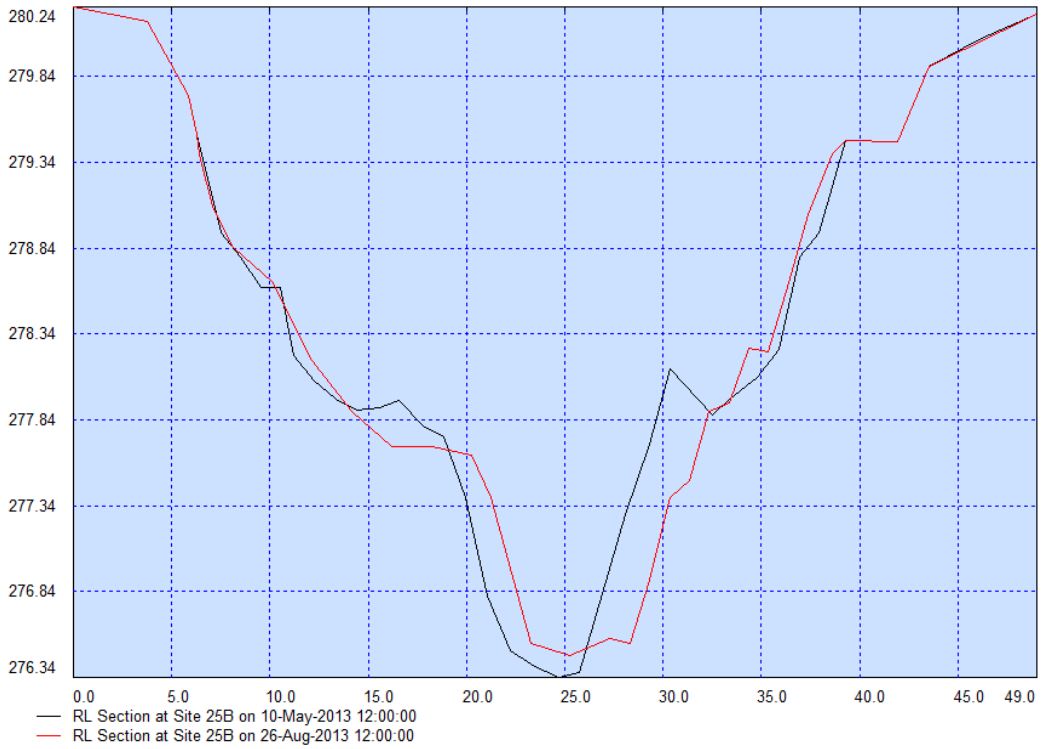

Figure 8 *Cross section number 25B (below bridge) – pre-flush 11 May 2013 and post-flush 26 August 2013.*

A staff gauge shown in Figure 9 below has been installed on the Ōhau Channel State Highway 33 Bridge to determine the relationship between levels on Lake Rotorua and Lake Rotoiti, particularly during times of flooding.

Figure 9 *Ohau Channel/State Highway 33 staff gauge located on pillars of State Highway 33 Bridge at Mourea.*

6.2.3 Velocity monitoring

Velocity measurements have been made at several locations along the Ohau Channel before and during the flush test to assess any changes (if any) in velocities.

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.

The monitoring concluded no significant change in velocities during the flush and has been reported 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.

Part 7: Conclusion

This 2013/2014 report satisfies consent requirements to report annually on the Ohau Weir and Okere Gates consents by 1 June each year.

These consents have been 'operational' since the consent renewal signed 21 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).

Monitoring and investigation of various sites will continue to provide valuable information in terms of the consent or until reviewed.

The findings of the Hinehopu Water Table Monitoring Study determine that the Consent Holder is not responsible for flood mitigation measures along Tamatea Street resulting from Okere Gate operations. The resultant high water table is the result of high surface and ground water in the wetland and drain on land leased by Department of Conservation situated to the east of Tamatea Street.

There are no recommendations to review other consent conditions or the Operational Management Plan for this reporting period.

The consent holder deems that it has fulfilled its management and operation obligations for the 2013/2014 year as recorded in this annual report.

Lake Rotoiti at Emery Store – 15 July 2014.