COLLABORATIVE DEVELOPMENT OF LAKE ROT0ITI OPERATIONAL STRATEGY

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ABSTRACT

A new operational strategy has been developed for the consent to operate the Okere Gates structure that controls levels in Lake Rotoiti through discharge to the Kaituna River. Te Arawa Lakes Trust, the owners of the Rotoiti lakebed (under the Te Arawa Lakes Act, 2006) and Bay of Plenty Regional Council, Rivers and Drainage Group, jointly developed the programme to determine the operational strategy for renewal of the consent.

The process to consult with affected parties and develop and refine an operational strategy is described. This was undertaken in three distinct stages. Stage 1 included modelling of several different operational options and evaluation of these options in terms of environmental, cultural, social and economic well beings. The modelling which comprised both hydrological and operation optimization is briefly presented together with the challenges to evaluate option performance in terms of the well beings. Stage 2 involved considerable community consultation, engagement and discussion to refine the operational strategy and undertake an environmental assessment of the proposed operations. Collaborative efforts to arrive at a solution that the diverse parties could "live with", is summarized. Stage 3, from filing the consent application to issue of the consent, describes issues addressed in developing the operational management plan based on the operational strategy.

The paper provides insights into the challenges and lessons learned in iwi/local government collaboration on lake and river resource management.

KEYWORDS

Rotoiti, Okere, Te Arawa, Environmental, Cultural, Social, Economic, Optimisation

PRESENTER PROFILE

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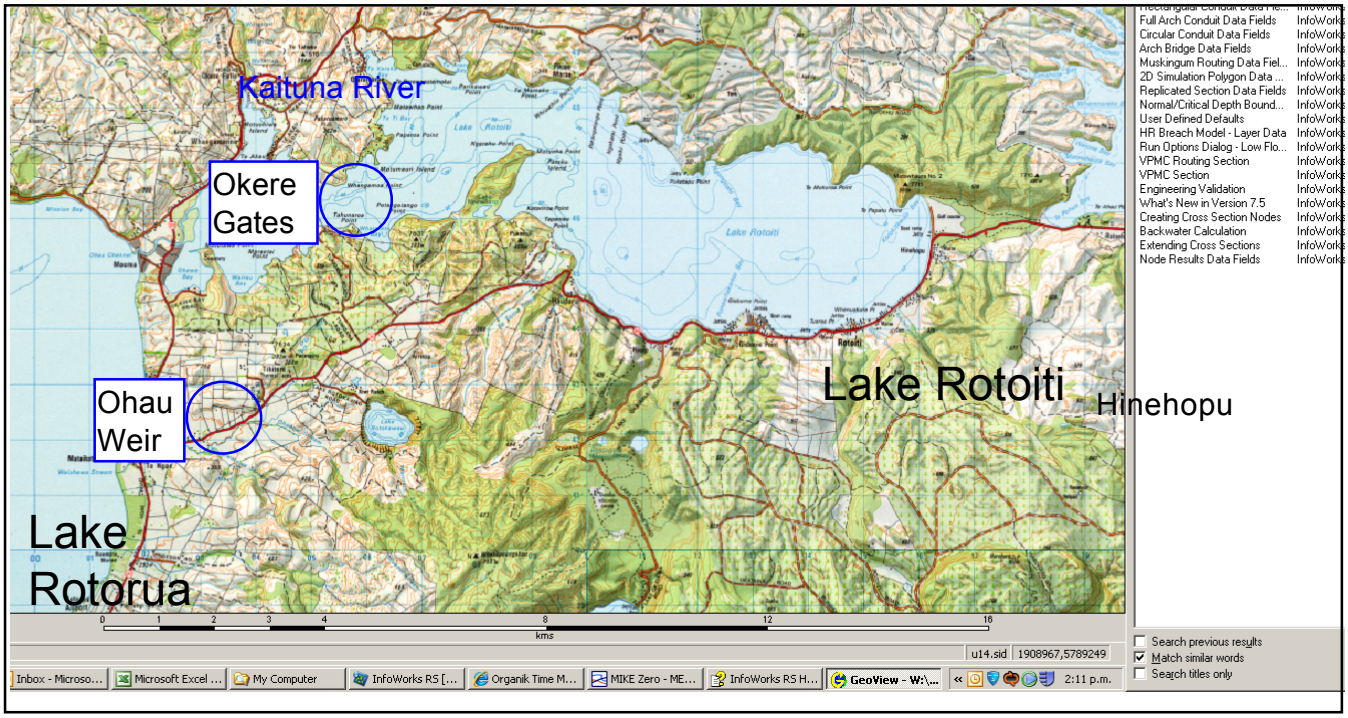
1 INTRODUCTION

Levels in Lake Rotoiti are controlled by the operation of the Okere Gates at the outlet of the lake (Figure 1) and inflow from upstream Lake Rotorua through the Ohau Weir and Ohau Channel. Consents for both the Okere Gates and Ohau Weir structures expired in June 2010. A collaborative process to renew the consents for both structures was developed by the consent holder, Bay of Plenty Regional Council, Rivers and Drainage

Group (now renamed Environmental Hazards Group) together with Te Arawa Lakes Trust (landowner of Te Arawa Lake beds) to meet the statutory requirements of both the Te Arawa Lakes Settlement Act and the Resource Management Act (RMA). The programme commenced in February 2009 and was set up in three stages described in more detail later. The consents were issued in February 2011, however appeals on the consents have been filed with the Environment Court. The process to collaboratively develop the operational strategy on which the consent renewal was based is presented with a focus on the operational strategy for Lake Rotoiti since the range of possible operational options for the Okere Gates is extensive while the Ohau Weir structure has little opportunity for operational flexibility.

Figure 1: Location of Lakes Rotorua and Rotoiti, the Okere Gates and Ohau Weir

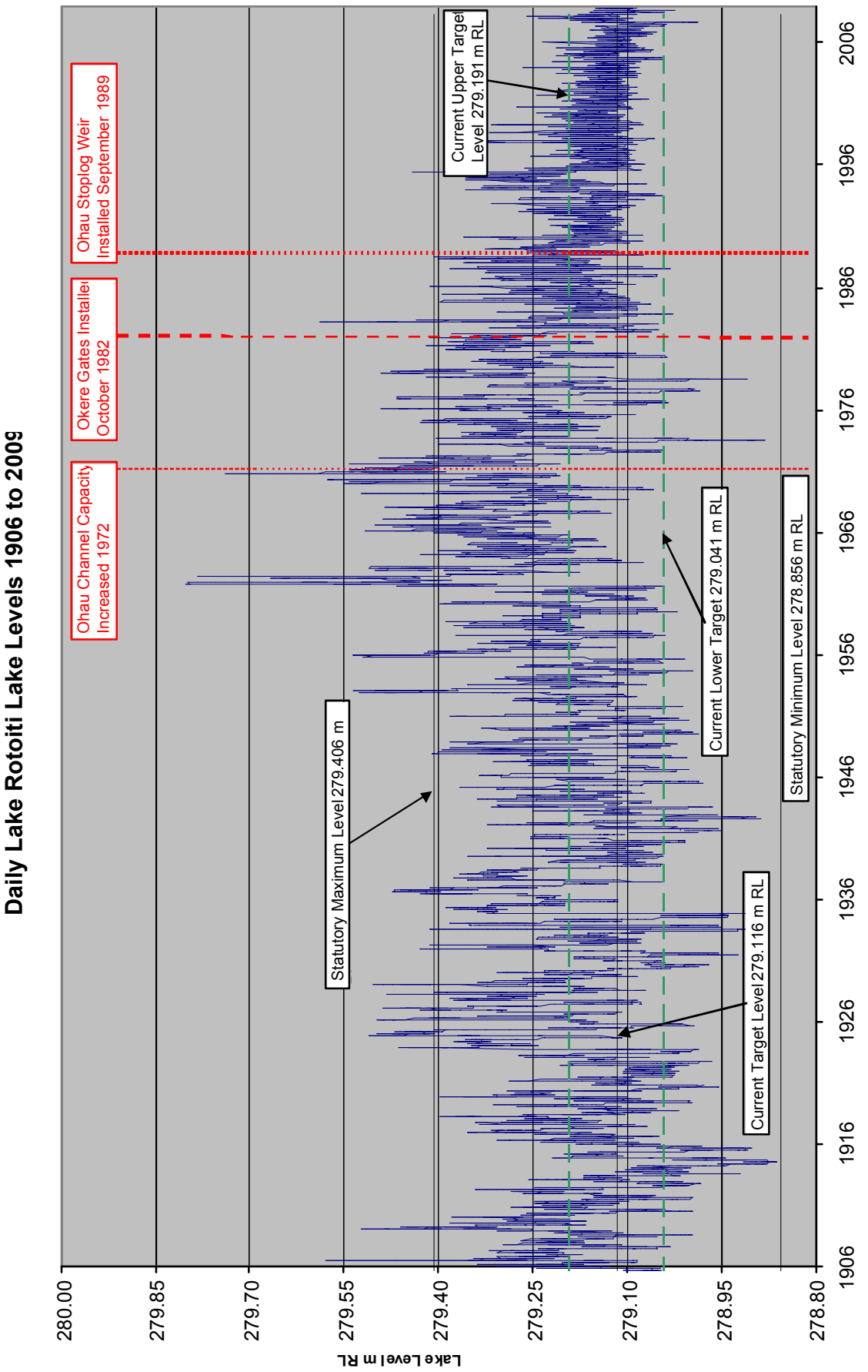


2 BACKGROUND

2.1 LAKE ROTOITI

Lake Rotoiti is the third largest of the 12 major lakes in the Rotorua region collectively known as the Rotorua Te Arawa Lakes. It was formed following an eruption about 8,500 years ago and is dammed by lava from that eruption at its natural outlet to the Kaituna River. Lake Rotoiti has an area of 35 km^2 and consists of a deeper Central Basin and a shallower Western Basin. The maximum depth of the lake is 94m with a mean depth of 31m. The catchment area draining into Lake Rotoiti is about 125 km².

Figure 2: Daily recorded Lake Rotoiti levels 1906-2009


Daily Lake Rotoiti Lake Levels 1906 to 2009
Ohau Channel Capacity Increased 1972
Okere Gates Installed October 1982
Ohau Stoplog Weir Installed September 1989
Statutory Maximum Level 279.406 m
Current Upper Target Level 279.191 m RL
Current Lower Target 279.041 m RL
Current Target Level 279.116 m RL
Statutory Minimum Level 278.856 m RL
Lake Level m RL
280.00
279.85
279.70
279.55
279.40
279.25
279.10
278.95
278.80
1906
1916
1926
1936
1946
1956
1966
1976
1986
1996
2006

Historically flow out of Lake Rotoiti was controlled by the narrowing of the Kaituna River and the Okere Falls at the outlet to Lake Rotoiti. Historical levels for Lake Rotoiti are shown in Figure 2 from 1906 through to the end of 2009. The historical lake levels provide the context within which much of the discussion about the proposed operational strategy occurred.

A natural annual fluctuation in Lake Rotoiti levels of about 500 mm is observed in the early part of the record from 1906 through to the mid 1940's. There is a trend of increased lake levels from the mid 1940's through to the mid 1970's attributed to increasing de-vegetation and land development. Prior to the construction of the Okere Gates in 1982, water levels in Lake Rotoiti fluctuated naturally, controlled only by the natural constriction and a rock ledge at the outlet to the Kaituna River.

2.2 OKERE GATES STRUCTURE AND EXISTING OPERATIONS

The Okere Gates structure was designed to control extreme high and low Lake Rotoiti levels by increasing floodwater outflows and reducing natural outflow in dry times to prevent undesirable low lake levels. The gates were constructed in 1982 and have effectively controlled Lake Rotoiti levels since that time (Figure 2). The structure is a substantial radial triple gate structure operated remotely by a Bay of Plenty Regional Council operator from Whakatane. Lake level data is transmitted via telemetry to the operator who monitors lake levels and adjusts the gate settings as needed to meet consent conditions. Okawa Bay levels are used as the primary Lake Rotoiti water level monitor, however if failure occurs, the Okere Channel gauge provides secondary data that can be used for operation of the gates.

Photograph 1: Okere Gates Structure

Under the existing consent which has been in place since 1996, the Okere Gates are operated to maintain Lake Rotoiti to a target level of 279.116m (Reduced Level RL to Moturiki Datum). Note that all further levels are RL with respect to Moturiki Datum (Opus, 2010). A target range of 75mm on either side of the target level is specified and consent conditions dictate that the Okere Gates be adjusted to maintain levels as close as possible to the target level and within the target range whenever practicable. The gates are also operated to ensure that maximum and minimum flow rates and changes in the flow rates to the Kaituna River are not exceeded. The operation of the gates recognises the requirements of rafting operators on the Kaituna River, but the achievement of target levels takes precedence over recreational use of the Kaituna River. It is clear that under the existing consent, particularly since 1996, the levels in Lake Rotoiti have been constrained (Figure 2). In fact analysis of the data over the 10 year period from 1998-

2007 shows that 61% of the time levels have been constrained to within a 50mm range from 279.10 to 279.15m and 96% of the time levels have been within the 150mm range from 279.05 to 279.20m (see Figure 3).

3 PROCESS TO DEVELOP AND REFINE NEW OPERATIONAL STRATEGY

3.1 TE ARAWA LAKES TRUST ENGAGEMENT

Since the consents for the structures were previously granted in 1996, the ownership of the lakebeds of the twelve Rotorua Te Arawa Lakes has been transferred from the Crown to Te Arawa Lakes Trust under the Deed of Settlement of the Te Arawa Lakes Historical Claims and Remaining Annuity Claims 2004 and Te Arawa Lakes Settlement Act 2006. Under the settlement, Bay of Plenty Regional Council is required to engage with and involve Te Arawa on Rotorua Lakes issues.

The Rivers and Drainage Group as consent holder has involved Te Arawa Lakes Trust (TALT) representatives by including them on the team to develop the programme and strategy for consent renewal. A core team consisting of the Bay of Plenty Regional Council and Te Arawa Lakes Trust staff have proceeded with the programme to renew the consents with input from various consultants including Aurecon, Opus International, Hydrologics Inc., and several independent consultants.

Te Arawa Lakes Trust advised that engagement with Ngati Pikiao and other interested iwi and hapu groupings was essential in this process, and proposed the use of independent consultant Dr Kepa Morgan, of Ngati Pikiao descent. He was engaged by Bay of Plenty Regional Council to undertake technical and engineering evaluation as well as provide a cultural perspective, alongside other well beings, in the development of the proposed operational strategy. Dr Morgan introduced the concept of the Mauri Model that equally weighted each of the well beings. This was used in the initial evaluation of operational options.

3.2 PROCESS

The approach to renew the consent was divided into three distinct stages.

Stage One (February 2009 to December 2009) involved consideration of the approach to be taken for the application, and included the consideration of several different options which were modelled during this stage. A wide starting point range was initially specified for Lake Rotoiti to allow for further consultation, modelling and refinement of operations during stage 2. An initial "starting point" consent application was filed with the consent authority to meet the required deadline in order to keep operating the consents in accordance with Section 124 of the RMA.

Stage Two commenced directly after Stage One and extended through to filing of the revised consent application in September 2010. This stage involved further consultation, water quality modelling and the development and refinement of the proposed operational strategy. It also included revising the Assessment of Environmental Effects (Opus 2010) based on the proposed operational strategy.

Stage Three commenced with public notification of the consent on 13 September 2010 and included public notification of the consent, receipt of submissions, and an RMA consent hearing before three Commissioners. Following deliberations the commissioners issued a decision on the consent, received 1 February 2011.

Not covered in this paper is the next stage of the process which is the process to resolve appeals on the decision. Appeals have been filed with the Environment Court and mediation will be entered into, which if not successful in resolving the substance of the appeals, will result in an Environment Court hearing.

3.3 APPROACH

The team approached the process to renew the consents without a pre-conceived idea of the final operational strategy. The approach was based on a desire to improve environmental effects of lake level operations and maximise benefits to the four well beings, namely environmental, cultural, social and economic well beings.

Cultural well being was considered specifically by introducing the concept of the Mauri model (Morgan, 2006). Cultural measures were included alongside environmental, social and economic measures in the Mauri model which equally weighted each of the well beings. The Mauri model was used in the initial evaluation of operational options and a complex web based questionnaire developed to determine Mauri model measures for further evaluation. In the end a simplified set of performance measures were used in the final evaluation of the operational strategy.

Considerable collaboration and consultation with community groups and lake users was undertaken through public meetings and further targeted small group stakeholder meetings to ensure that social and economic well beings were also addressed.

An extensive environmental assessment of the initial and final proposed operations was undertaken (Opus, 2010) to ensure that environmental considerations were addressed. The environmental assessment of alternative operations for Lake Rotoiti is discussed in further detail in an accompanying paper presented to this Stormwater Conference by Britton et al. (2011).

A guiding principle in the process of ensuring environmental wellbeing was to ensure that the water quality of Lake Rotoiti was not impacted by the operations of the Okere Gates and also that the quality of water flowing down the Kaituna River was not impacted by the operation of the structures. Water quality modeling of the proposed option was undertaken (Hamilton, 2010) and expert opinion provided on the assessment of water quality in the Kaituna River (Mackintosh, 2010).

There is little flexibility in the current consent to meet diverse user needs such as flows within a range for recreational users or to allow lake fluctuations within a range to provide environmental benefits. To achieve greater flexibility and provide benefits for all four well beings, the consent application was for a proposed operational strategy with a range and desired distributions within the range, rather than specific target operational levels.

The desired outcome of the new operational strategy was for more natural lake level fluctuations and more flexible operations, than under the current consent.

4 COLLABORATION AND CONSULTATION

Collaboration and consultation has been an integral part of the entire process to develop an operational strategy for the renewal of the consents to operate the Okere Gates and Ohau Weir structures. Collaboration and consultation undertaken in each stage of the process is described in more detail in this section. Collaboration, particularly with iwi, was most important because of the change in ownership of the Rotorua Te Arawa Lakes beds to the Te Arawa Lakes Trust, and the fact that the consent holder, the Rivers and Drainage Group at Bay of Plenty Regional Council, did not have a pre-conceived interest in a particular outcome for the operation of the structures. Although the Rivers and Drainage

Group manages the downstream flood protection scheme it is recognized that operation of the Okere Gates does not provide significant relief for the scheme since flow through the Okere Gates contributes less than 20% of the flow in the Lower Kaituna River, the remainder coming from other tributaries, catchment runoff and predominantly the Mangorewa River.

4.1 STAGE 1 – INITITIAL OPERATIONS DEVELOPMENT: FEB–DEC 2009

At the beginning of 2009 the Rivers and Drainage Group entered into a partnership with the Te Arawa Lakes Trust to investigate options for the ongoing operation of the lake level control structures of both lakes. The main objectives of the resource consent application were identified, namely to review the operating regime of the Ohau Channel and Okere Gates and define an appropriate strategy to maximize benefits to the wider community, balancing benefits to cultural, environmental, social and economic well beings.

Feedback was invited from stakeholders in February 2009 on how well they thought the Okere Gates had worked until then and what their priorities would be for any future operation of the structure. Using the feedback, three operational options were developed and modelled (Aurecon, 2009).

Initial modeling results were discussed with a committee of Bay of Plenty Regional Council, Te Arawa Lakes Trust Management and at separate hui with TALT and Ngati Pikiao. It was specifically requested by Ngati Pikiao that independent consultant Dr Kepa Morgan join the working party to ensure that the cultural perspective was recognized in the development of operational options.

Collaboration with Dr Kepa Morgan resulted in the modeling of a 4th (low weir) option. He also provided considerable insight into anecdotal recollection of historic lake levels and cultural values which were used in performance measures for comparison of the relative benefits of different operational options.

Later option 5 was included in the suite of options modelled to best represent natural measured lake levels. Hydologics Inc. consultants (Britton and Wickramanayake, 2010) were retained to undertake modelling that optimized the value or benefit of the performance measures, resulting in further operational options (6 and 7). Discussion of the options is presented in more detail in Britton et al. (2011).

Towards the end of stage 1, meetings were held with Rotorua District Council (RDC) senior staff and RDC's Rotorua Te Arawa Lakes Standing Committee to inform them of progress.

An open public meeting was held on 28 October 2010 to present the proposed operational range at that stage. The day consisted of presentations to specific groups of stakeholders in the morning followed by an open public meeting in the afternoon. Prior to the open public meeting it had not been determined which model option best represented historic data and also what the proposed option should be. As a result an initial starting point range of 600mm, that spanned the range of the options, was presented at the open day.

There was a strong response from the community at the public open day with key issues being: the need for water quality modeling; objections to extreme low lake levels indicated in the initial range; concerns about jetty access, boat navigation and safety; fears of loss to property values and operational concerns by recreational lake users and commercial boat operators with respect to low lake levels. The community also requested input to determine the performance measures for use in optimizing the operational options.

Peer review of the model runs and measured data (Opus, 2010), and investigation to locate and use old photographs to validate anecdotal recollection was undertaken.

Investigations included file and library searches as well as inviting local residents to submit photos of various lake shore locations that showed lake levels and dates for cross reference and confirmation. All consented structures and jetties around the lake were surveyed to determine their level relative to lake levels to enable the determination of impacts of lake levels on these jetties and structures.

A workshop was facilitated in November 2009 by Dr Kepa Morgan for stakeholders to determine performance criteria using the Mauri model. Time constraints on the day of the workshop resulted in performance criteria not being agreed upon.

A resource consent application needed to be filed before the end of December 2009 in order to keep operating the structures, so the wide range presented at the public open day, with an amended upper limit (extended to the current consented maximum) was used as a "starting point" range for the consent application, with the understanding that further work would be undertaken to refine this range.

4.2 STAGE 2 – REFINEMENT OF OPERATIONS: JAN-SEP 2010

Given that the Mauri model workshop did not provide the outputs required to get a definitive set of performance criteria, it was decided to use a web survey to allow stakeholders to provide input via the internet on performance criteria (indicators, measures and weightings). These were to be used in optimization modelling to help refine the preferred option. The web survey was implemented in early 2010, however it proved to be extremely complex and difficult to complete, and resulted in inconclusive Mauri model performance measure weightings.

To proceed, key issues were identified from the public meetings and workshops and later confirmed through collaboration and consultation via a number of smaller meetings with stakeholders. The majority of key issues identified are listed below:

- The desire for an open and transparent process
- Enviromental sustainability
- Better water quaility in Lake Rotoiti and in the Kaituna River
- Consideration of cultural values
- Return of natural beaches around Lake Rotoiti
- More natural Rotoiti Lake levels (wider range)
- More natural Kaituna River flows
- Use of the Okere Gates to help reduce downstream peak flood flows
- Intelligent management to enhance water quality
- Trials of different operations
- An operational strategy that builds water storage and maximizes water quality
- Levels above specific minima to ensure safe navigation and jetty access
- Levels below specific maxima to reduce the risk of lakside flooding and drainage and sceptic tank issues
- Specific levels to address cultural needs

- Removal of the Okere Gates (or at least modelling of their removal)
- Opportunity for regular review of the proposed operations

Based on the key issues and previous work done on the Mauri model performance measures, a simplified set of performance indicators was developed. These measures were used to quantify differences between options and in the selection of the proposed option (Britton and Wickramanyake, 2010).

Given the importance placed on water quality that came through in the early consultation, Professor David Hamilton, the Lakes Chair at Waikato University, was engaged in early 2010 to carry out water quality modelling of the options being considered (Hamilton et al., 2010).

Further public open days were held in April 2010 at which the preferred option (at that time) and water quality modelling results were presented. There was significant concern by many at the open day, that once Lake Rotoiti levels fell below a particular level (279.10m) structures would become increasingly difficult to use and amenity would be lost. Lower levels during the summer/autumn holiday period were of particular concern.

Collaboration and condultation then entered a phase where a number of smaller meetings and workshops were held with stakeholders to arrive at a solution that the diverse parties could "live with" even if they didn't totally support the proposed option. The Rivers and Drainage/TALT team met with several groups during this time including Ngati Pikiao, Rotorua Lakes Community Association, Rotorua District Council staff and the CEO's of TALT and Bay of Plenty Regional Council and Rotorua District Council.

Presentations were also made to the Rotorua District Council's Te Arawa Lakes Standing Committee and their Works Committee, the Kaituna Catchment Control Scheme Liaison Group and Regional Council's Regulation, Monitoring and Operations Committee. For details of meetings and presentations refer to the Assessment of Environmental Effects (Opus, 2010).

Collaboration and discussion with stakeholders in smaller groups allowed full discussion of relevant issues and lead to further investigations being undertaken to better understand issues and determine likely outcomes of changes to lake levels. Examples of additional investigations follow.

Through working closely with Ngati Pikiao, two tests that released water down the Ohau channel were made to determine if sediment could be moved down the channel and also if algae could be moved through the system. These tests, that have been referred to as "flush tests" were carried out in June and September 2010 and are described in more detail in Britton (2010).

Groundwater monitoring was implemented at Hinehopu where elevated water tables and subsidence pose a concern to the community. Groundwater monitoring is continuing (BOPRC, 2010a).

A boat trip to look at beaches and better understand the cultural and community value of beaches was undertaken with Ngati Pikiao and Lakes community representatives.

In June, following extensive consultation and collaboration the applicant, the Rivers and Drainage Group, together with their TALT partners selected their preferred option that offered the widest community benefit and balanced the four well beings without adversely effecting the environment.

Based on the preferred option an operational strategy, that is, operational target ranges rather than a single operational target, was developed. The Assessment of Environmental Effects was updated (Opus, 2010) and the application notified on 13 September 2010.

4.3 STAGE 3 – SUBMISSIONS, DEVELOPMENT OF OPERATIONAL MANAGEMENT PLAN AND HEARING: SEP-DEC 2010

In this stage, from filing and notification of the consent application until the decision from the hearing commissioners, collaboration and consultation efforts focused on reviewing and addressing with stakeholders, substantive issues received in the submissions. Discussion were held with the Consent Authority and their consultants particularly with respect to outstanding information, the development of draft consent conditions and a draft operational management plan based on the operational strategy.

4.3.1 OPERATIONAL STRATEGY

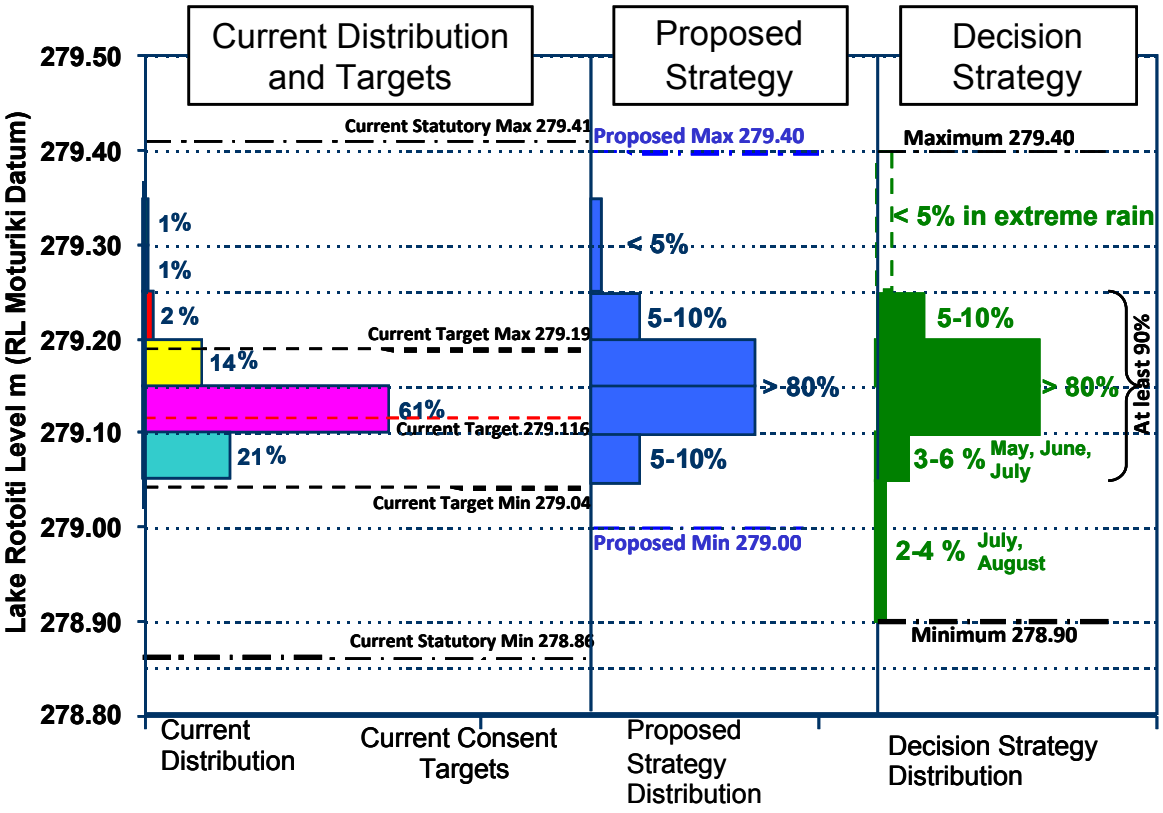
The keystone of the consent application and outcome of the collaboration and consultation that went into the application, was the development of an operational strategy that would improve the environmental and cultural outcomes for Lake Rotoiti, without adversely affecting social and economic values. Through collaboration and consultation there was considerable compromise to come up with an operational strategy that was not only an improvement over the current operations but also a solution that all parties could "live with".

In this paper an important distinction between a proposed or preferred option and an operational strategy is made. To clarify, an option in this case, is a model run with its associated results and indications of performance. The proposed option is the option that was modelled and used in community consultation and represents the distribution of lake levels that would be achieved with specific climatic input data (10 years of rainfall and climate data from 1998 to 2007 in this case) and a specific set of operational rules.

The operational strategy is different in that it is a target distribution of levels with target operating ranges that have a good chance of being able to be achieved in a range of climatic conditions. An operational strategy provides flexibility within the target operating ranges to account for natural climatic variability. Also because the operational strategy is a range, more than one operation rule or set of operational rules can be used to achieve the target. To achieve an operational strategy, operational guidelines can be used together with operator intelligence and perhaps other information such as climate forecasting to achieve the operational strategy.

To illustrate this, Figure 3 below shows on the left, the distribution of actual levels from 1998 to 2007 from operations according to the current consented operational targets. The consent requires that Lake Rotoiti levels be kept as close as possible to the target level of 279.116m at all times. Levels can deviate from the target within the target maxima and minima, 75mm on either side of the target level, however the consent requires operation of the Okere Gates so as to return lake levels to the target level as soon as practicable. Lake levels have clustered around the target level in a narrow 50mm band for 61% of the time. Deviations above and below the target have been due to natural wet or dry conditions when it has not been possible to keep the lake at the target level.

Figure 3: Lake Rotoiti level distribution under current operations and consent targets compared with proposed operational strategy and decision operational strategy



The proposed operational strategy is shown in the center of Figure 3 and the operational strategy specified in the consent conditions associated with the decision of the hearing (Arcus et al., 2011) is shown on the right side of Fgure 3. This is referred to as the "decision strategy".

Both operational strategies recognize the need for a range of levels that follow natural wet and dry patterns. The difference between the proposed and decision operational strategies is the recognition by the commissioners of the importance placed by Ngati Pikiao on the flush tests. In the decision, the lowering of the lake for a short time (or flush) is a specified target in the operational strategy.

4.3.2 OPERATIONAL MANAGEMENT PLAN

A draft Operational Management Plan has been developed based on the proposed operational strategy described above (BOPRC, 2010b) The OMP contains details of how procedures will be implemented to give effect to the consent conditions. In summary the OMP includes:

- A description of gate operations, structure plans and maintenance procedures
- Methods for achieving the distribution given in the operational strategy
- Procedures for flushing

- A description of monitoring and reporting on lake levels and operations particularly with respect to the target level ranges laid out in the operational strategy

- Methods to address safety, flood warning and emergency issues

- Procedures to overcome difficulties that may affect the successful operation of the Okere Gates.

This Operational Management Plan will be modified and finalized following resolution of appeals on the consent decision**.**

5 CHALLENGES AND LESSONS LEARNED

Collaborative development of an operational strategy has been a very expensive and time consuming process. Better project management, clear definition of the project scope, early commitment of adequate budget is essential for this type of approach.

The risks and benefits of deviating from the project scope should be clearly identified. In some cases it may be better to not undertake the further investigations requested by stakeholders or not expand the options investigated if time and funds do not permit. Calculated risk should be taken to get to the end point within the allocated time and budget.

Realize that with more collaboration, the process will be considerably more expensive. Adequate time and funds need to be budgeted for resolution of issues.

In this case, modelling of options was undertaken too early in the process resulting in expensive remodelling. Ideally most of the consultation and resolution of issues should be done prior to modelling. Options should be analysed and refined through collaboration and best professional judgment to get a solution or two that are close to optimal which can then be modelled for final assessment of environmental effects. It has become increasingly popular to use models as a means of building consensus. This is an expensive pathway.

A simple set of performance measures should be determined prior to modelling. Ideally there should be agreement between stakeholders on most of the perfomance measures to be used. Be careful not to try to include too many performance measures. A simple set of performance measures will better facilitate evaluation of different options.

While collaboration and consultation is an important part of the process, a balance needs to be struck and a point reached at which the applicant submits their application and lets the hearing commissioners decide the outcome. In this case, throughout the process the a number of competing community considerations were considered including Maori cultural concerns, the interests of general lake users and fishers, the preservation of lake/river water quality and ecology and flood mitigation. Through extensive consultation with all those groups and after much investigation, an operational strategy that achieved an appropriate balance between all those competing interests and met the sustainable management purpose of the RMA was developed. The Commissioners (Arcus et al., 2011) agreed but as noted above this application is currently subject to appeal.

6 CONCLUSIONS

An operational strategy has been developed for Lake Rotoiti using a collaborative approach lead by the owners and operators of the lake level control structure (Bay of

Plenty Regional Council, Rivers and Drainage Group) and the owners of the lakebed (Te Arawa Lakes Trust). A new operational strategy was required to renew the current consent to operate the Okere Gates structure that expired in June 2010.

Key to developing the operational strategy was the extensive consultation and engagement process that was developed and undertaken by the Rivers and Drainage/TALT partnership. The focus of setting out a robust programme that allowed for collaboration and consultation and approaching the development of the strategy without a pre-conceived idea of the operational outcome allowed for true dialogue with different stakeholders and interested parties.

A very wide initial or starting point operational range was used to embrace the diverse opinions and desires of stakeholders. This included considering the diverse views of Ngati Pikiao, other iwi/hapu interests on the Kaituna River, lakeside residents, recreational and commercial users of the lakes and the wider community. Through modeling of different options, development of a set of performance criteria to compare the value of the options in terms of environmental, cultural, social and economic well beings, and optimizing the performance of different options, the wide range was narrowed considerably.

Investigations, trials and a genuine interest in understanding where each party's point of view helped the team in their consideration and evaluation of the different options and in development of the final operational strategy.

The final operational strategy represents the operational solution that best balances the greatest benefit to the wider community based on the performance measures and considerable collaboration and consultation.

The proposed operational strategy provides for a target distribution of lake levels that has a good chance of being able to be achieved in a range of climatic conditions.

The application has been heard by commissioners and a decision to award the consent issued. Although appeals have been lodged, the team is committed to working through mediation and an Environment Court hearing if needed to finally implement a new operational strategy.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the support of Bay of Plenty Regional Council and Te Arawa Lakes Trust and numerous individuals in these organizations for proving assistance and support of this work. Also the work by various consultants is gratefully acknowledged. Finally thanks to Scott Fowlds from Environment Waikato and Stephen Coleman from Auckland University for reviewing this paper.

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