

Bay of Plenty Regional Council

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Ohau Channel Flush Monitoring (Fish & Game Consultation) – Channel Velocities & Depth

1 Introduction

Fish & Game New Zealand have requested that Bay of Plenty Regional Council arrange monitoring of the flow velocity in the Ōhau Channel. Such monitoring shall occur annually between 1 May - 30 June and again between 1 October - 30 November, for the duration of this consent. The purpose of this monitoring is to determine any effects of the flush on the velocities within the Ohau Channel. This report summarises velocity measurements obtained 12 July 2018 – 01 August 2018 and briefly discusses the impact of consented Lake Rotoiti levels on velocities in the Ōhau Channel.

2 Velocity Measurements – Method

Velocities within the Ōhau Channel were measured at 3 locations:

- a) Lake Rotorua Outlet (1m below upstream edge of weir)
- b) 50m below Lake Rotorua Outlet (long term BOPRC flow monitoring site)
- c) Mourea (SH 33) Bridge

Conditions on 12 July 2018 included waves <0.1m, with 0-3kts wind from the southwest quarter. The effects of both wind and waves was minimal. Conditions on 01 August 2018 were dead calm.

Velocity and depth measurements were recorded while Lake Rotoiti was at the following level:

12 July 2018 279.131m
01 August 2018..... 279..008m



Figure 1 - Map of Velocity & Depth Monitoring Sites

A Sontek M9 Acoustic Doppler Current Profiler (ADCP) instrument mounted in an Ocean Sciences trimaran was used at each site.

It should be noted that the purpose of these measurements was to gather velocity data (ie. water speed), rather than total discharge (ie. the volume of water to pass a given point on a stream bank per unit of time, eg. m^3/sec). Therefore any reference to total discharge at the weir, or at SH 33, should be ignored. Gauging across the top of a weir or over large weed banks (such as those found at SH 33 Bridge) is not advisable when measuring total discharge.

In regard to the Lake Rotorua Outlet (weir) site, the ADCP method was only used through the main channel. A rod-mounted FlowTracker2 acoustic current meter was used across the control structure, on either side of the main channel, due to the shallow water depth. The main channel represented two thirds of the flow and the highest velocities in the cross section. This is consistent with previous measurements. The three separate survey sections making up the complete cross section are provided separately for reference, in Section 3.



Figure 2 - Weather and water conditions, on 12 July 2018



Figure 3 - Weather and water conditions, on 1 August 2018

3 Velocity Measurements – Results

3.1 Ōhau Channel at Lake Rotorua Outlet (1m below upstream edge of weir):

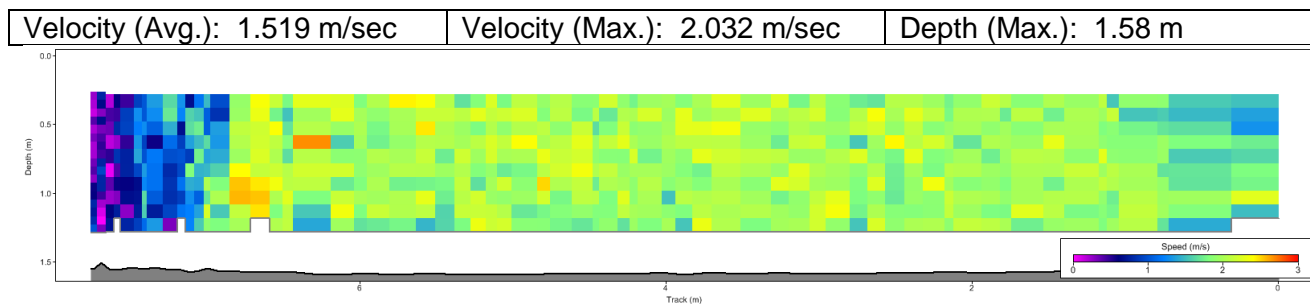


Figure 4 - Water Velocities: Ohau Channel at Lake Rotorua Outlet - Centre of Weir, on 12 July 2018.

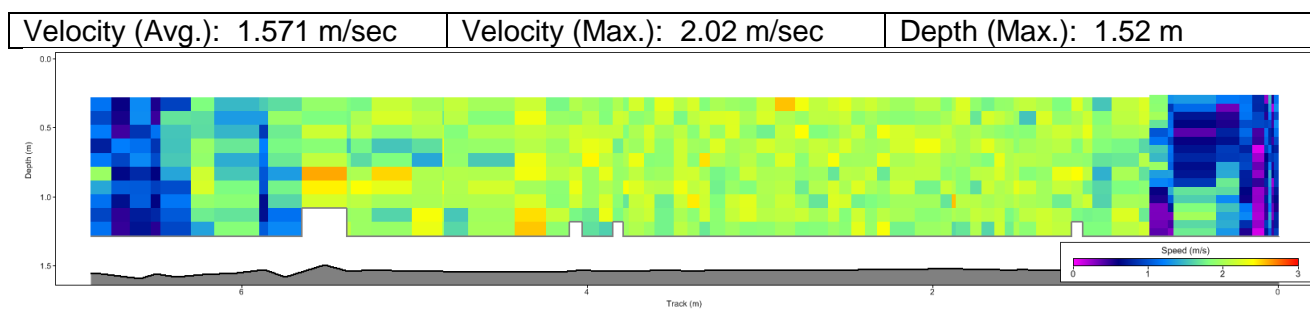


Figure 5 - Water Velocities: Ohau Channel at Lake Rotorua Outlet - Centre of Weir, on 01 August 2018.

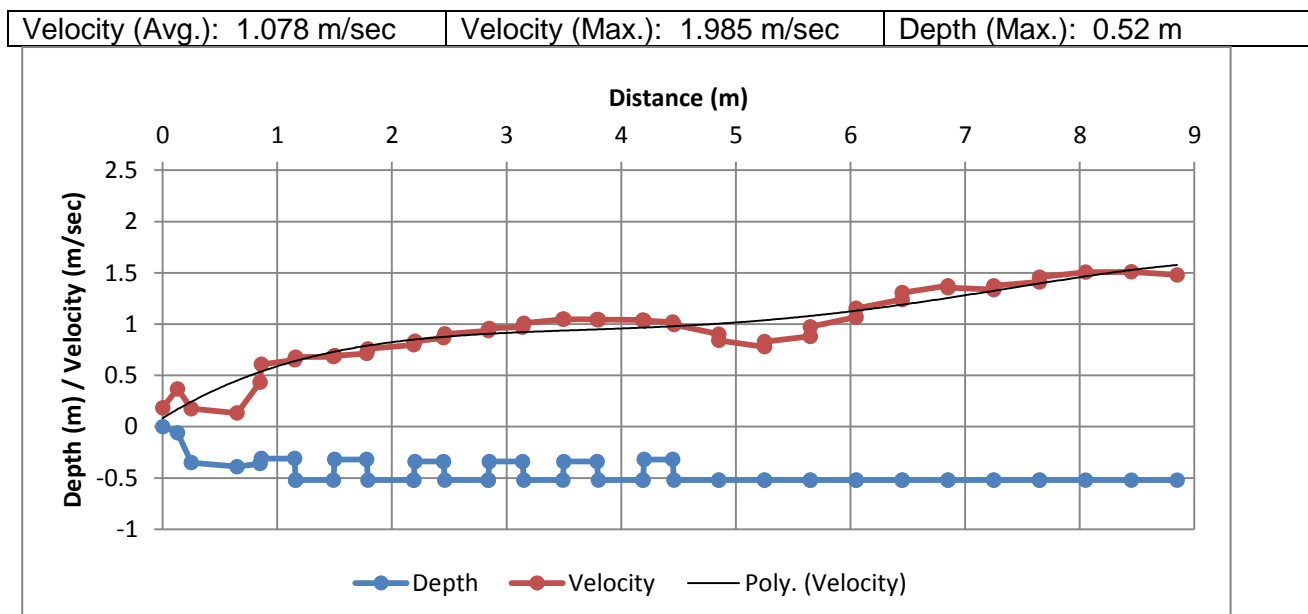


Figure 6 - Water Velocities: Ohau Channel at Lake Rotorua Outlet - True Left Bank Section of Weir, on 12 July 2018.

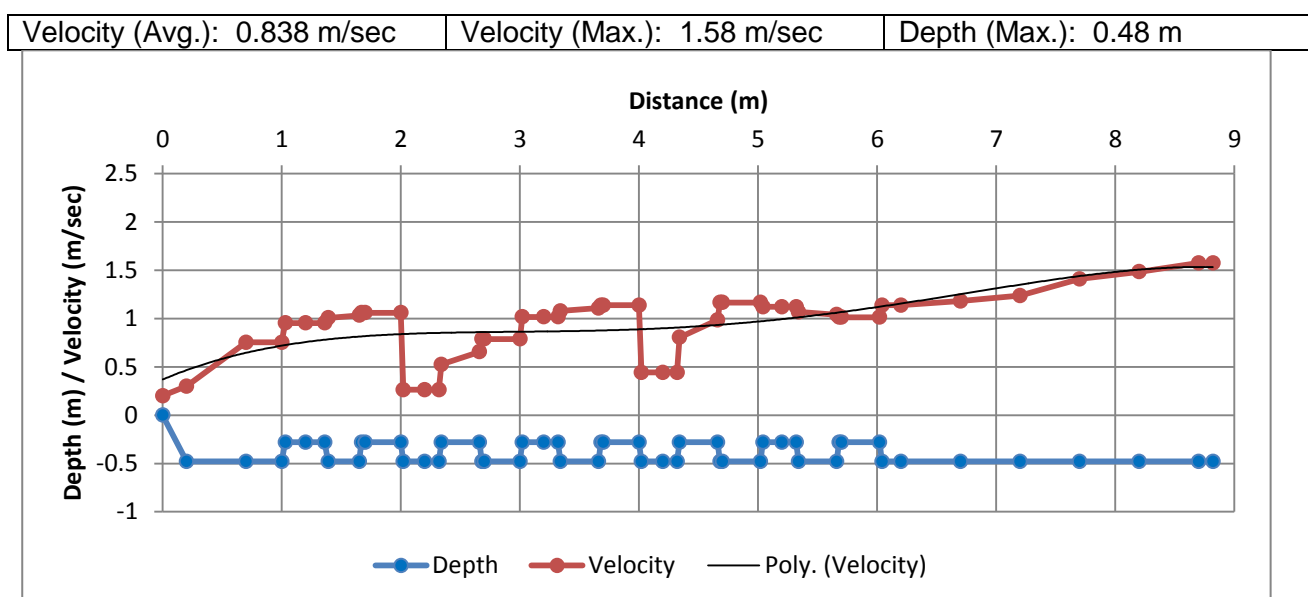


Figure 7 - Water Velocities: Ohau Channel at Lake Rotorua Outlet - True Left Bank Section of Weir, on 01 August 2018.

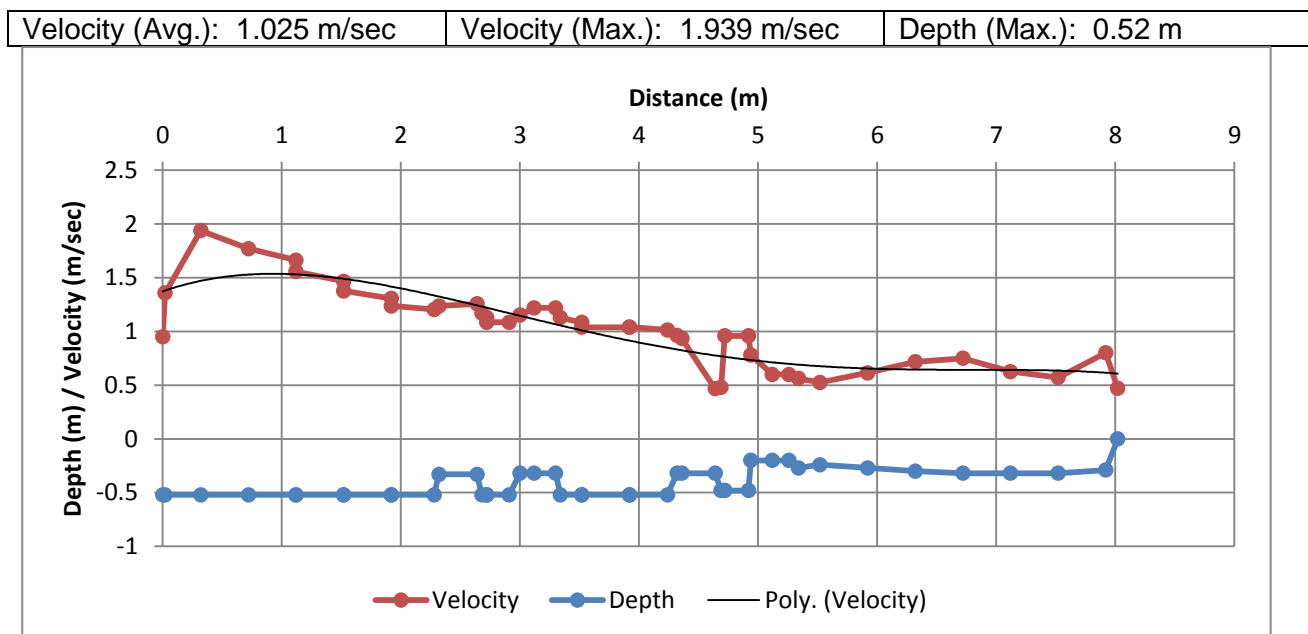


Figure 8 - Water Velocities: Ohau Channel at Lake Rotorua Outlet - True Right Bank Section of Weir, on 12 July 2018.

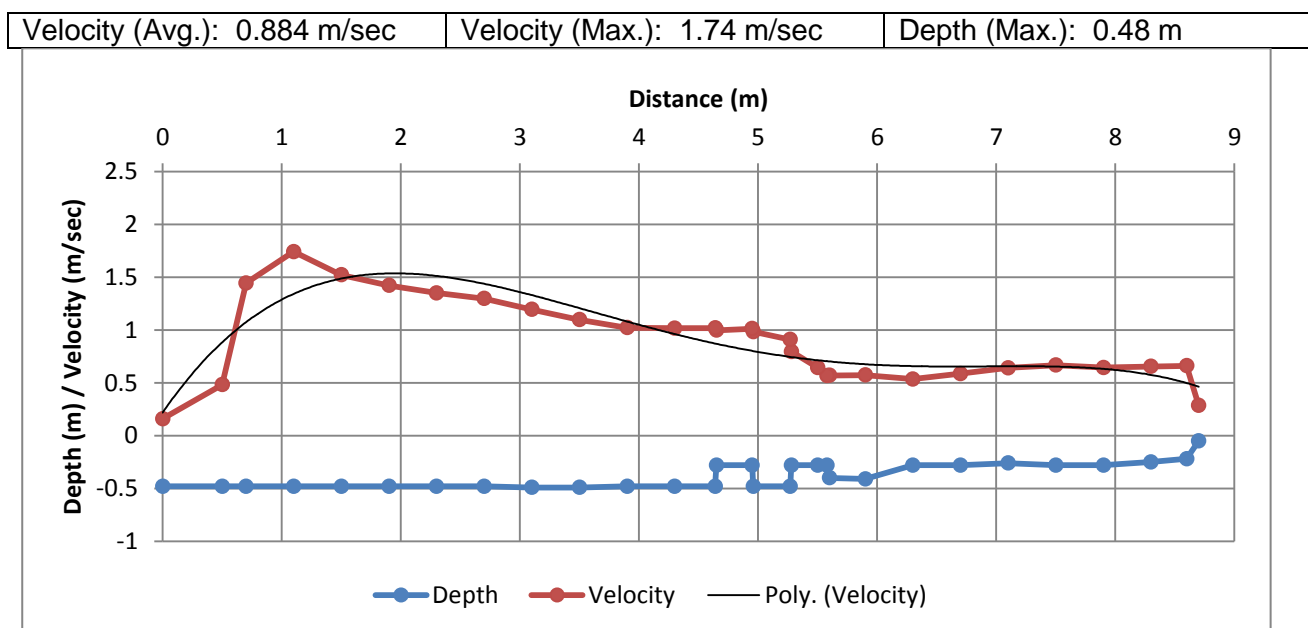


Figure 9 - Water Velocities: Ohau Channel at Lake Rotorua Outlet - True Right Bank Section of Weir, on 01 August 2018.

3.2 Ōhau Channel at 50m below Lake Rotorua Outlet (long-term BOPRC flow monitoring cross section):

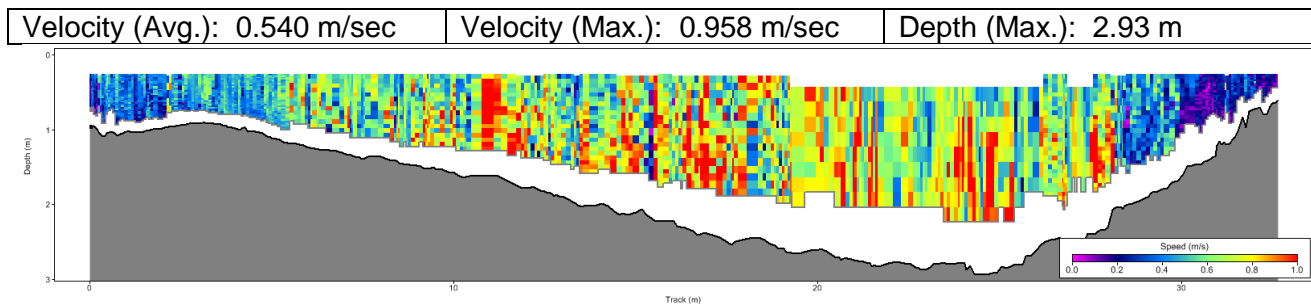


Figure 10 - Water Velocities: Ohau Channel at 50m below Lake Rotorua Outlet, on 12 July 2018.

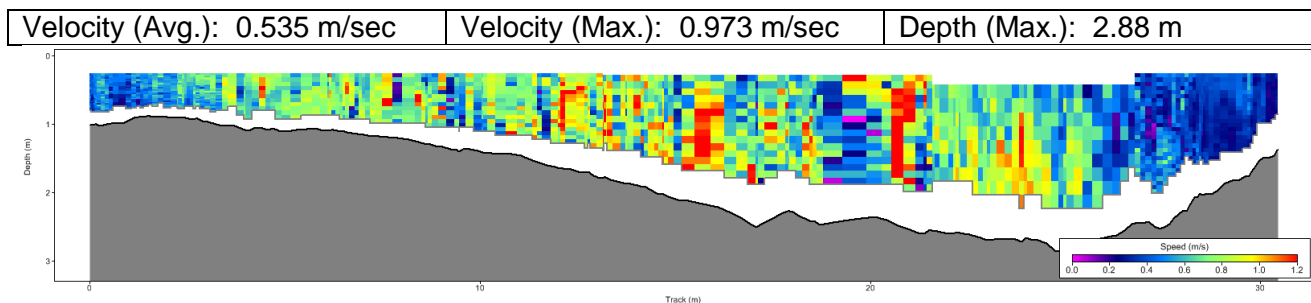


Figure 11 - Water Velocities: Ohau Channel at 50m below Lake Rotorua Outlet, on 01 August 2018.

3.3 Ōhau Channel at Mourea (SH 33) Bridge:

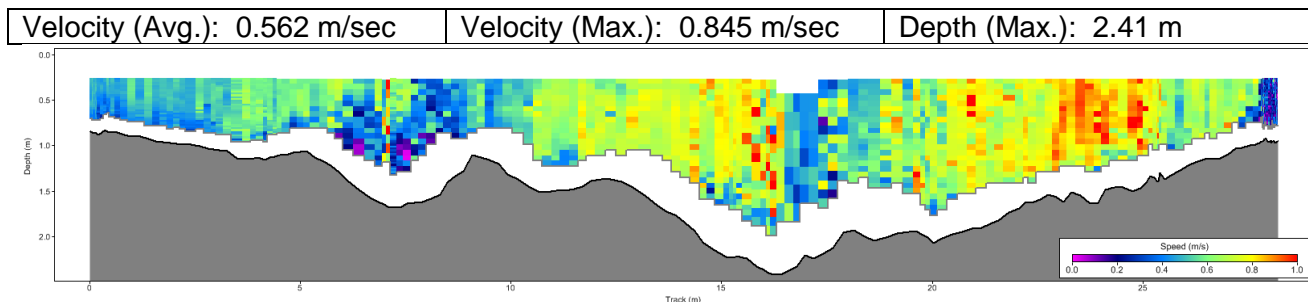


Figure 12 - Water Velocities: Ohau Channel at Mourea (SH 33) Bridge, on 12 July 2018.

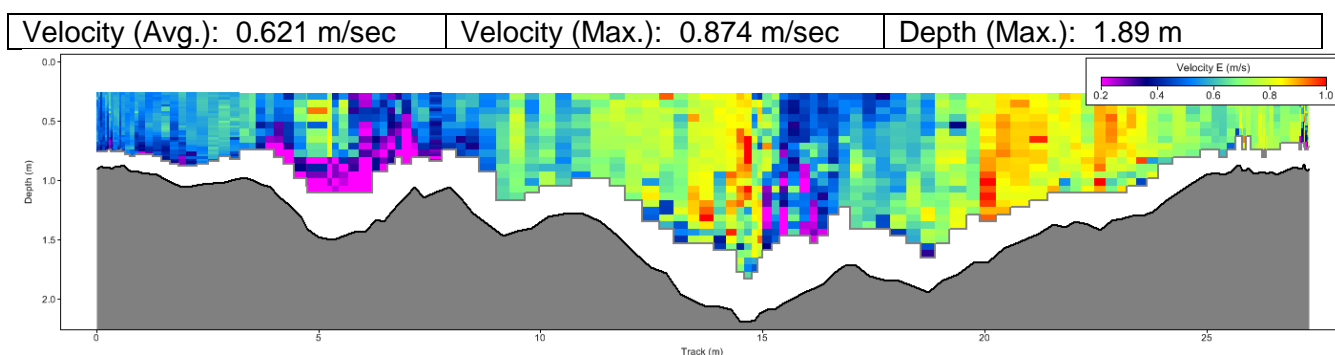


Figure 13 - Water Velocities: Ohau Channel at Mourea (SH 33) Bridge, on 01 August 2018.

4 Ohau Channel Velocity & Depth Measurements – Discussion

Mean and maximum velocities recorded at all sites were consistent with previous measurements (taking into consideration a possible gauging error of +/- 8%).

There was no significant change in mean or max velocities before and after the drawdown period, at any of the sites. A change in velocity appears on the right bank section of the weir, nearest to the main channel. However, this was attributed to a difference in gauging methodology, where the flow was measured by a new staff member, behind the stainless steel panel on the edge of the main channel.

The plots shown above are representative examples taken from a series of 2-8 transects (per site, per day) which are normally averaged to produce an accurate flow measurement. The degree of variation shown between each sampling date is similar to that seen in individual transects collected 5 minutes apart from each other. This includes subtle changes in velocity around stream margins and, in particular, behind the bridge abutments at the SH 33 site.