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Hydrological Characteristics of Lake Kate Sheppard and the Effects on Inanga Spawning

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1. Introduction

Following the 2011 earthquake sequence LKS and surrounding areas experienced severe liquefaction and lateral spreading. This raised concern for species such as Inanga and their spawning habits within the lake. Because of this the AvON has conducted extensive remediation work to remove excess sediment and add native and exotic vegetation around the area in order to induce regeneration of the area. As a point of ongoing interest in the area, AvON has taken particular interest in the than 0.3m were preferred for feeding, and the overall mean velocity of streams used for habitat were 0.1-0.6 m/s^{-1} (Richardson & Taylor, 2002).

Jowett (2002), discusses the flow characteristics needed for Inanga to drift feed, where they drift within the current whilst consuming nutrients needed. This maximises their food inputs while minimising the energy exerted to feed. Another key finding is that habitat selection is more dependent on flow velocities and depth of habitat is less important. Inanga were observed in water less than 0.3m but overall prefer to feed in water depths greater than 0.3m (Jowett, 2002). This is why vegetation presence within LKS is a key factor, allowing Inanga to feed in deeper eddies.

Suspended sediment in the water column was discussed by Baker & Smith (2014), who suggested that Inanga have adapted to travel further upstream during nightfall to evade capture by animals and humans. However when they do travel during daylight hours, a higher concentration of su003psthave measurements of the lakes depth. This would have been correlated with data from the Valeport and the ADV in order to identify tidal movement.

Spot measurements were taken with more simplistic instruments that were easier to manoeuver and transport to different

Figure 4 is a graph showing the tidal fluctuations within the Lake. The data that was collected and used to generate this graph was from a previous year's CT2X Logger. However, it correlated well to the Valeport data collected this year. It indicates that there is a long outgoing tide of 9 hours and a short steep incline of incoming tide for 4 hours.

5.3 Flow Probe Data

Table 1, shows measurements taken on the two western horizontal culverts that also feed into Lake Kate Sheppard. The measurements were taken using the flow probes, which lack sensitivity. However these give a good enough indication of the average flows at both 10cm and 20cm depth.

	Flow Probe Data	
	10cm depth	**20cm depth**
Culvert 1 (South)		

5.4 Cross Sections

Figure 5 is a cross section of the bathymetry of the Lake at the Avon River Culvert. It shows that the lake floor is not completely flat therefore the topography on the lake bed provides variation in flow velocities. The red arrow indicates where the Valeport was located (in front of the culvert).

the rainfall event, calculations were conducted on samples after filtration. This was done by averaging the change in weight (g) for E and E2 (7g and 9g) which was 8g. This value was subtracted by the change in weight of sample D which was 6g. This gave a difference of 2g which was then divided by the original change (6g). This gave a percentage change of 33.33% (2dp). Figure 6 indicates the location in which the samples were taken throughout the lake.

The sediment samples were collected from a wide spread area in order to obtain a representative indication of suspended sediment levels in LKS. Sample A was taken on the western side of the lake which is headed in the direction of where ideal Inanga spawning conditions were observed.

Sample	Before Weight	After Weight	Change in weight	% change in weight
A	0.120g	0.134g	14g	11.67%
B	0.122g	0.127g	5g	4.10%
C	0.123g	0.128g	5g	4.07%
D	0.121g	0.127g	6g	4.96%
E	0.123g	0.130g	7g	5.79%
E2	0.122g	0.131g	9g	7.38%

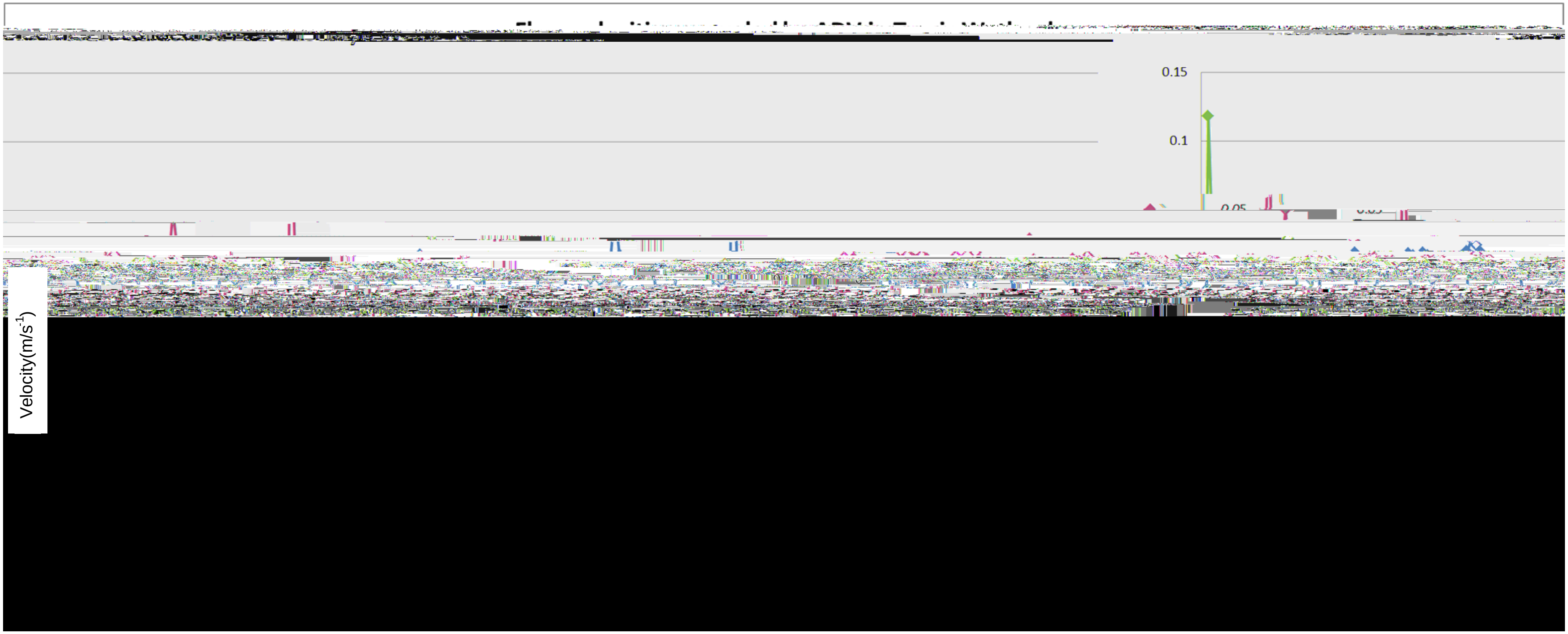

Figure 8. ADV data shown in a daily average format from the 27 8 15 – 8 9 15.

On August 1st 2014, low tide in LKS was recorded at 1910 (7:10pm) and high tide at 2310 (9:10pm), while high tide at

6.9 Future Research

- More of a focus on the Western Culvert in terms of flow to correlate with research surrounding salinity.
- Conduct additional field studies using this research as a baseline for a long-term case study.
- Conduct research over the entire spawning season.
- The total count of the number of whitebait located in the Avon River versus LKS at the time of spawning. As well as the effects from the changes in velocity as the flow moves from the Avon River into LKS.
- Water Quality and what impacts that has or could have

9. References

Baker, C.F., & Smith, J.P. (2014). Influence of flow on migration and capture of juvenile galaxiids in a large river system. New Zealand Journal of Marine and Freshwater Research, 49(1), 51-63. doi:10.1080/00288330.2014.941372

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