



Investigation of the Mawheraiti River & the New River Brown Trout Fisheries

*Results from sports fish spawning surveys, electric fishing, drift dives and environmental data collected between May 2019-May 2020 from the Mawheraiti River & the New River
Brown Trout Fisheries*

West Coast Fish & Game Region

Baylee Kersten, Fish & Game Officer, July 2020



Staff carrying out electric fishing in Rough and Tumble Creek, Mawheraiti Catchment in November 2019.

Interim report for: 1115 Sports Fishery Research

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Spawning/recruitment success of Brown Trout on the West Coast

Introduction

The Mawheraiti River and New River have been identified as locations requiring research. The Mawheraiti River is a river that requires attention as the brown trout population has undergone significant decreases and increases over the years observed through drift diving and angler reports. To ensure the fishery is correctly managed and protected it is essential we understand these fluctuations and try to mitigate the significant drops in the brown trout population.

Little is known about the New River but given its proximity to Greymouth, it would be beneficial for local licence holders for it to be a thriving fishery. What is limiting the fishery will hopefully be identified by the work carried out in this project but obtaining a better understanding of the fishery is ensured.

The Mawheraiti or Little Grey River is a tributary of the Grey River. Its catchment incorporates tributaries from the Inland mountainous flanks of the Paparoa Ranges and the rolling hills of the Reefton and Ikamatua areas. The Mawheraiti River joins the Grey River near the township of Ikamatua.

The Mawheraiti River fishery is identified as 'regionally significant' in its rural reaches (FGWC, 2011) and receives between 150 & 480 angling days each season (Unwin, 2015). The Mawheraiti River has long been regarded by anglers as a nursery for the greater Grey River fishery and this is confirmed by the large number of small and medium size brown trout that have been observed in drift dive surveys.

The New River or Kaimata headwaters are in the hills to the west of Lake Brunner and flows down the north edge of the floodplain of the Taramakau River then turns north joining with Saltwater Creek before meeting the Tasman Sea. The New River fishery is identified as 'locally significant' (FGWC, 2011) and as of the 2014/15 angler survey estimated it receives 170 ± 70 angling days a season (Unwin, 2015).

This report is intended to provide an overview on the information gathered and reviewed for the work plan project 1115 – Sports fishery Research in the past year and build on former reports where relevant. The information gathered is also intended to inform the resource consent processing.

Methods

Streams were identified as potential spawning streams in the Mawheraiti River catchment and spawning counts were carried out when possible during the 2019 spawning season. Three suitable streams following confirmation of significant spawning activity from the counts were chosen to be study streams. The three streams represented a mixture of land uses and stream types. Electric fishing was carried out on the study streams three times between November and May. Temperature loggers were installed during the summer into two of the study streams. West Coast Regional Council (WCRC) has

aided in the collection of additional environmental data to allow potential identification of correlations between spawning/recruitment success and environmental impacts. Lastly annual drift dives were completed on the Mawheraiti as done so intermittently since 1993.

Working with WCRC a sonde was installed into the New River upstream of State Highway 6 in October. The sonde has been serviced by WCRC staff and the data has been sent through to Fish & Game. The sonde deployment was to obtain environmental data on the New River and the conditions trout are exposed to provide some scope on what may be limiting the fishery and requires further investigation.

Results – Mawheraiti River

Spawning Surveys

During the 2019 spawning period 19 spawning surveys were carried out in tributaries and the headwaters of Mawheraiti as can be seen in table one below. When Blackwater River was surveyed high numbers of trout were observed immediately downstream of where the salmon farm tributary joins. Given it appears they were not spawning and instead to be permanent residents the Blackwater River was considered not appropriate for a research site.

Table 1: Spawning Surveys carried out in the Mawheraiti Catchment during 2019

Date	Section/ Tributary	Brown Trout	Length surveyed (km)	Trout/km
20/05/19	Rough & Tumble Creek	25	6	4.17
24/05/19	Antonios Creek	18	6.3	2.86
04/06/19	Adamstown Creek	4	1.6	2.50
04/06/19	O'Malley Creek	10	1	10.00
07/06/19	Jacks Creek	1	1.5	0.67
07/06/19	Sawpit Creek	0	1	0.00
07/06/19	Mawheraiti Headwaters	4	1.8	2.20
07/06/19	Maimai Creek	2	0.9	2.44
14/06/19	Pattinson Creek	0	0.6	0.00
14/06/19	Bell Creek	3	1.5	2.00
14/06/19	Barney Creek	0	0.4	0.00
14/06/19	Dirty Mary Creek	1	1.7	0.59
14/06/19	Sleeper Creek	0	0.6	0.00
25/06/19	Adamstown Creek	0	1.6	0.00
25/06/19	Burton Creek	2	2.5	0.80
25/06/19	Lower O'Malley Creek	1	1.2	0.83
08/07/19	Snowy River	1	1.3	0.77
08/07/19	Blackwater River	58	3	19.33
08/07/19	O'Malley Creek	1	1.7	0.59

Research Streams

Three streams were identified as having spawning activity and being a suitable site to carry out electric fishing to assess recruitment success. Figure 1 below provides a photo of the streams where trout

spawning was observed. Figure 2 shows the distribution of the research streams in the Mawheraiti Catchment.



Figure 1: Images of research sites in the Mawheraiti Catchment.



Figure 2: Location of research sites in the Mawheraiti Catchment.

Electric Fishing

Table 2: Electric Fishing carried out in Mawheraiti Catchment in 2019-20

Date	Location	Area Sampled (m ²)	No. of trout from this year's spawn	No. trout 1+ years	No. Trout (per m ²)	Comments
22/11/19	O'Malley Creek	150	14	1	0.100	
11/02/20	O'Malley Creek	150	23	2	0.167	
07/05/20	O'Malley Creek	150	12	1	0.087	
22/11/19	Adamtown Creek	100	5	3	0.080	
11/02/20	Adamtown Creek	90	9	2	0.122	First 10m not fished due to wasp nest
07/05/20	Adamtown Creek	100	8	1	0.090	
22/11/19	Rough & Tumble Creek	200	2	14	0.080	Five 1+ years trout removed
11/02/20	Rough & Tumble Creek	160	6	6	0.075	Site brought slightly upstream & shorten
07/05/20	Rough & Tumble Creek	160	3	1	0.025	

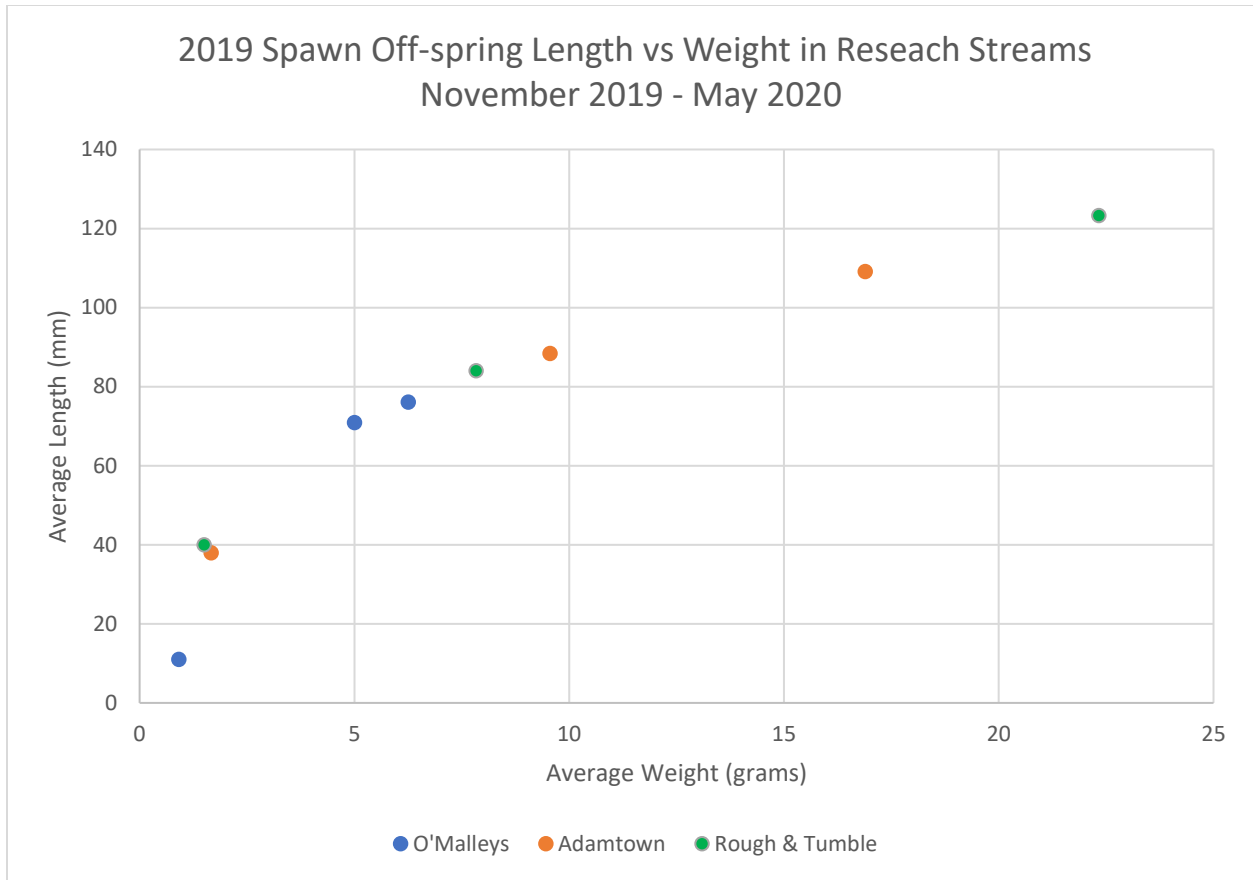


Figure 3: 2019 Spawn Off-spring Average Length vs Average Weight in Research Streams November 2019 - May 2020.

Drift Dives

This year the drift dives on the Mawheraiti River were completed on the 25 November 2019. At the SH7 bridge the count resulted in 117 small/km, 109 medium/km and 22 large/km. Numbers of fish were about average and very similar to last season but well down on the record count obtained in April 2017. The Mirfin's Bridge count was 22 small/km, 22 medium/km and 15 large/km. Numbers of small and medium fish were below average and well down on the record count obtained in February 2016 although the number of large fish was average.

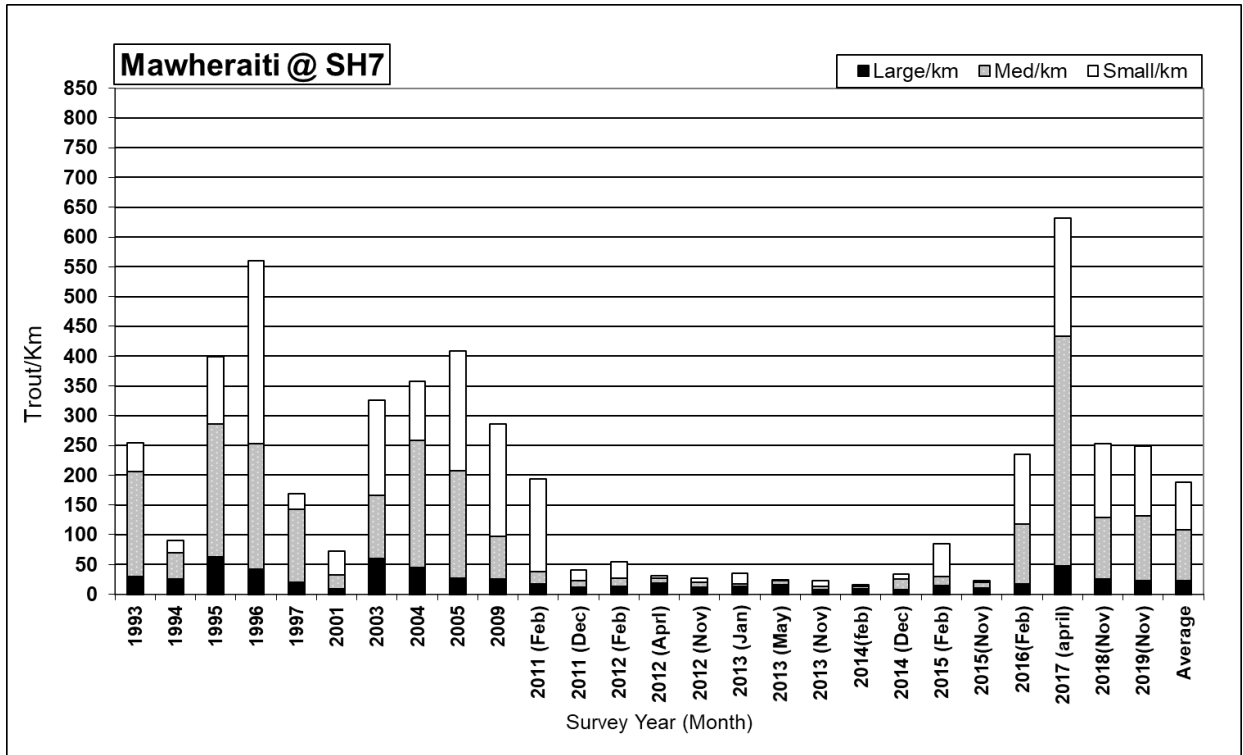


Figure 4: Number of Brown Trout recorded during drift dive surveys at the Mawheraiti River SH7 Bridge site 1993-2019.

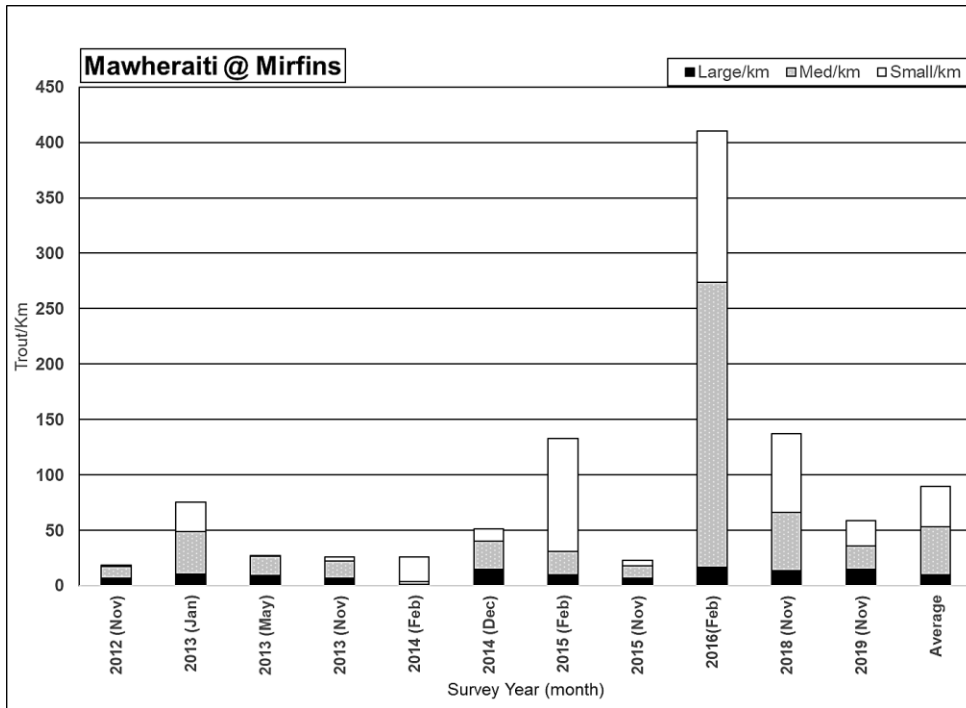


Figure 5: Number of Brown Trout recorded during drift dive surveys at the Mawheraiti River Mirfins Bridge site 2012-2019.

Environmental Data

Cawthron's paper *Water Quality Guidelines To Protect Trout Fishery Values* recommends that temperature does not exceed 19°C to avoid behavioural disturbances in brown trout (Hay, Hayes, Young 2006). Below in figure 6, it shows the Mawheraiti at Atarau exceeding 19 °C 67 days this season with the hottest temperature recorded being 24.3°C. A look upstream at a second temperature site on the Mawheraiti, Maimai State Highway 7 bridge, exceeded 19°C 62 days, with a temperature peak of 25.2°C.

Research streams temperatures were also recorded through summer either directly or by obtaining data of a stream nearby with similar character. All three streams ran cooler than the Mawheraiti River, with Rough and Tumble Creek (using Stoney Creek data) and Adamstown Creek peaking around 22-23 °C during January. O'Malley Creek ran much cooler never exceeding 19°C, likely a reflection of its dense riparian cover.

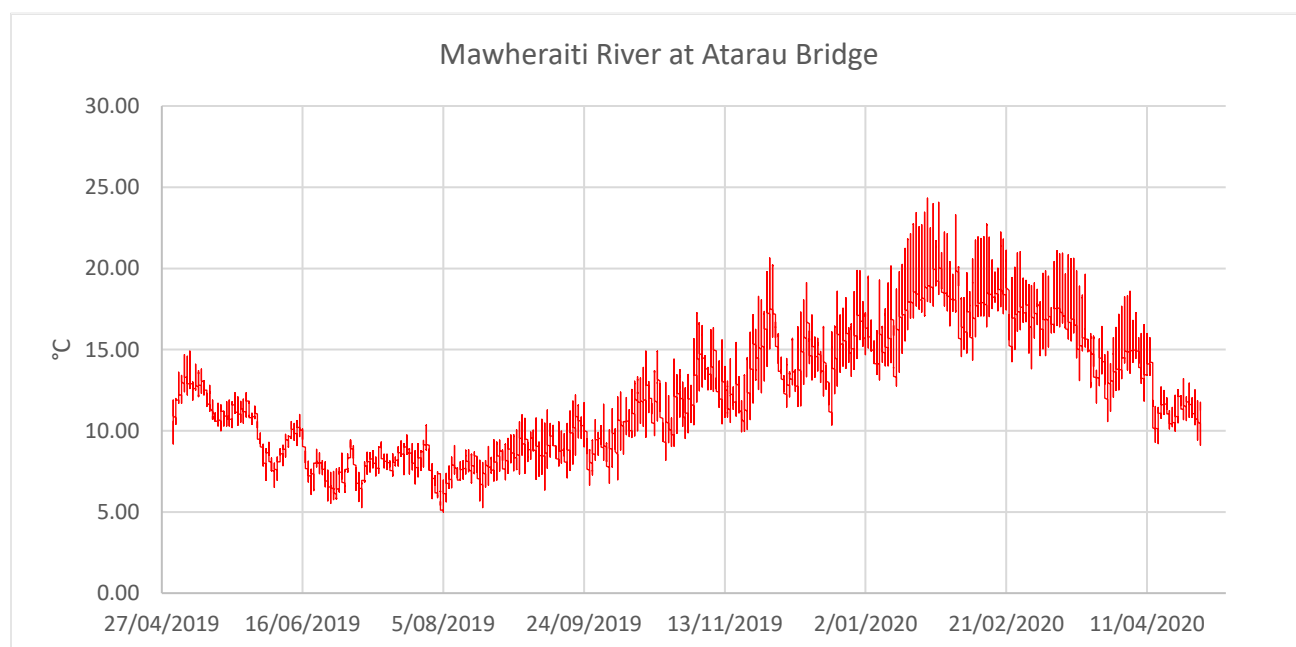


Figure 6: Temperature of the Mawheraiti River at Atarau Bridge April 2019 - April 2020.

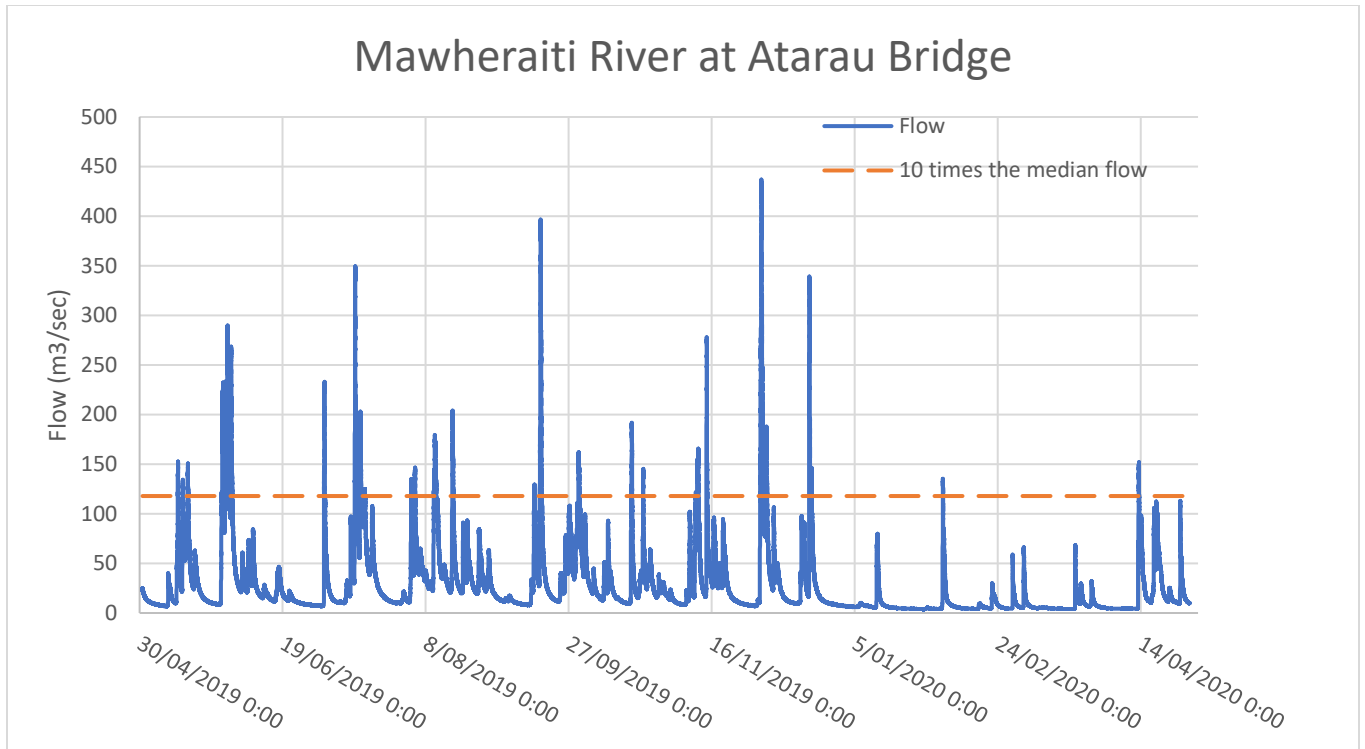


Figure 7: Flow of the Mawheraiti River at Atarau Bridge May 2019 - April 2020.

Above figure 7 shows the 39 days from May 2019 to May 2020 that the flow exceeds ten times the median flow. Of the 39 days that exceeded ten times the median flow 24 were during winter or spring – when trout recruitment is most vulnerable. Flow events that exceed 10 times the median flow have been shown in most rivers to disturb a substantial portion of the substrate. Therefore, flows above this magnitude also have the potential to displace or kill trout, especially juveniles. (Holmes, Gabrielson, Matthaei, Closs 2017)

New River Sonde Data

Figures 8, 9 and 10 below all look at the water quality parameter collected by the deployment of a sonde in the New River at the State Highway Six bridge. Figure 8 graph of turbidity compared to water level allows for identification of sediment plumes caused by disturbance other than flooding.

Figure 9 graph of water temperature and dissolved oxygen saturation, shows the New River predominately remained below 19°C other than the warm spell in late January where its temperature peaked at 21.2°C and 19°C was reached on 8 days. Dissolved oxygen saturation fluctuations started to increase in magnitude during stable periods of warm low flows but only twice got to the minimum desired range of 80% saturation. Although on the 27th of October, dissolved oxygen saturation plummeted to 64.3% with no obvious explanation. With temperature being around 11.3°C, there was 7mg/L of dissolved oxygen and therefore it likely would have had very little impact on the fishery.

Figure 10 shows the electric conductivity compared to water level. As expected, conductivity increases in low stable flow periods. In early April, the conductivity can be seen rising rapidly going off the graph, where it peaked at 34,192 uScm and reached 23,800 uScm three days in a row. A sudden increase or decrease in conductivity in a body of water can indicate pollution. The 7th, 8th and 9th of April 2020 tide and sea conditions were checked by WCRC staff to look at it being potentially caused by seawater intrusion but it was deemed to be unlikely from their analysis.

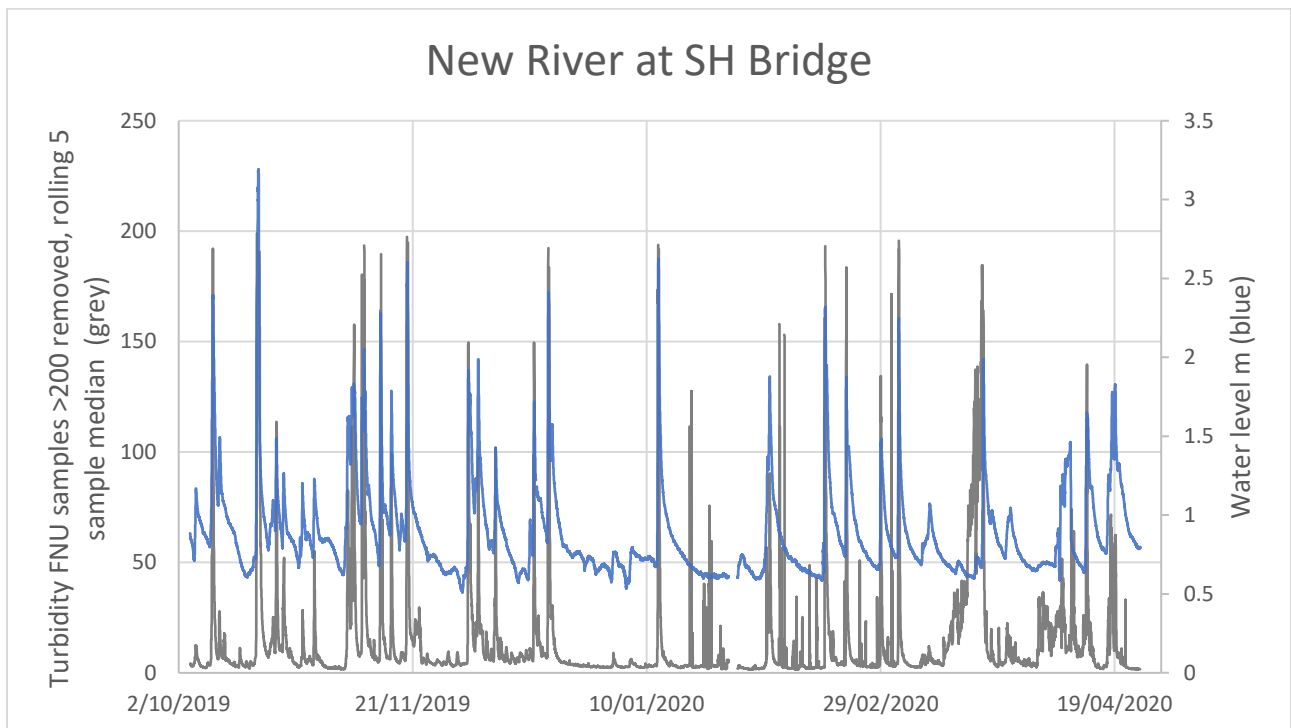


Figure 8: Turbidity and water level of the New River at State Highway Six Bridge October 2019 - April 2020.

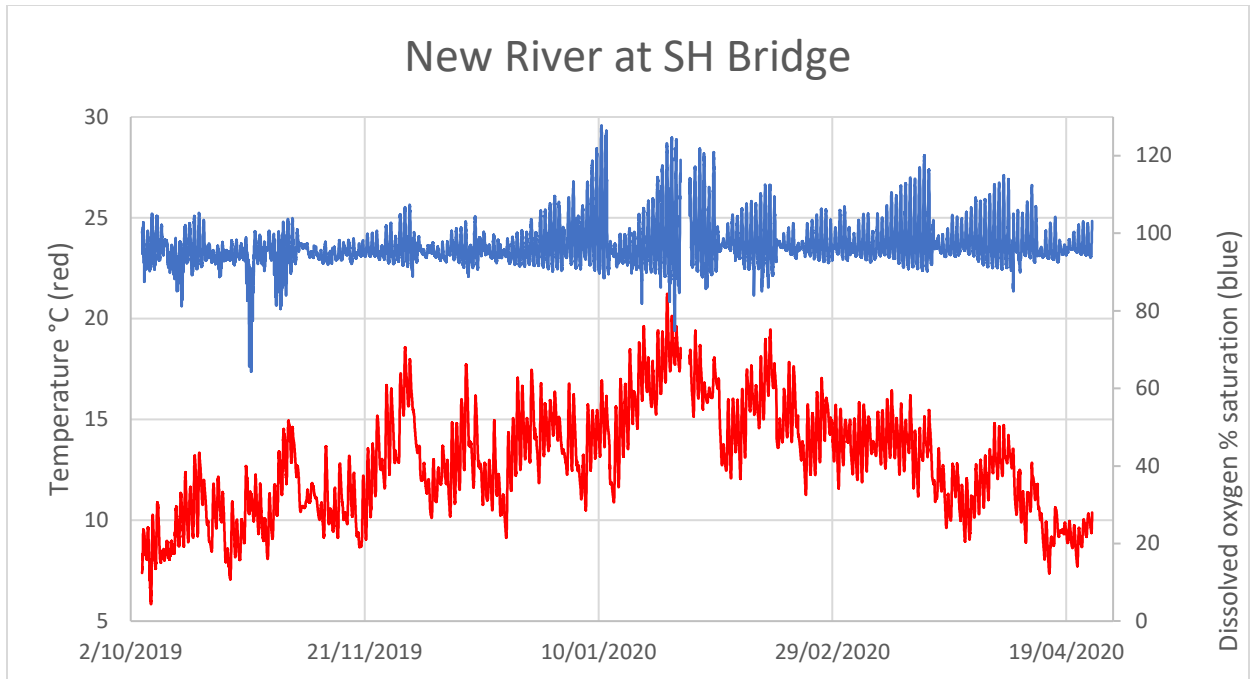


Figure 9: Temperature and dissolved oxygen saturation of the New River at State Highway Six Bridge October 2019 - April 2020.

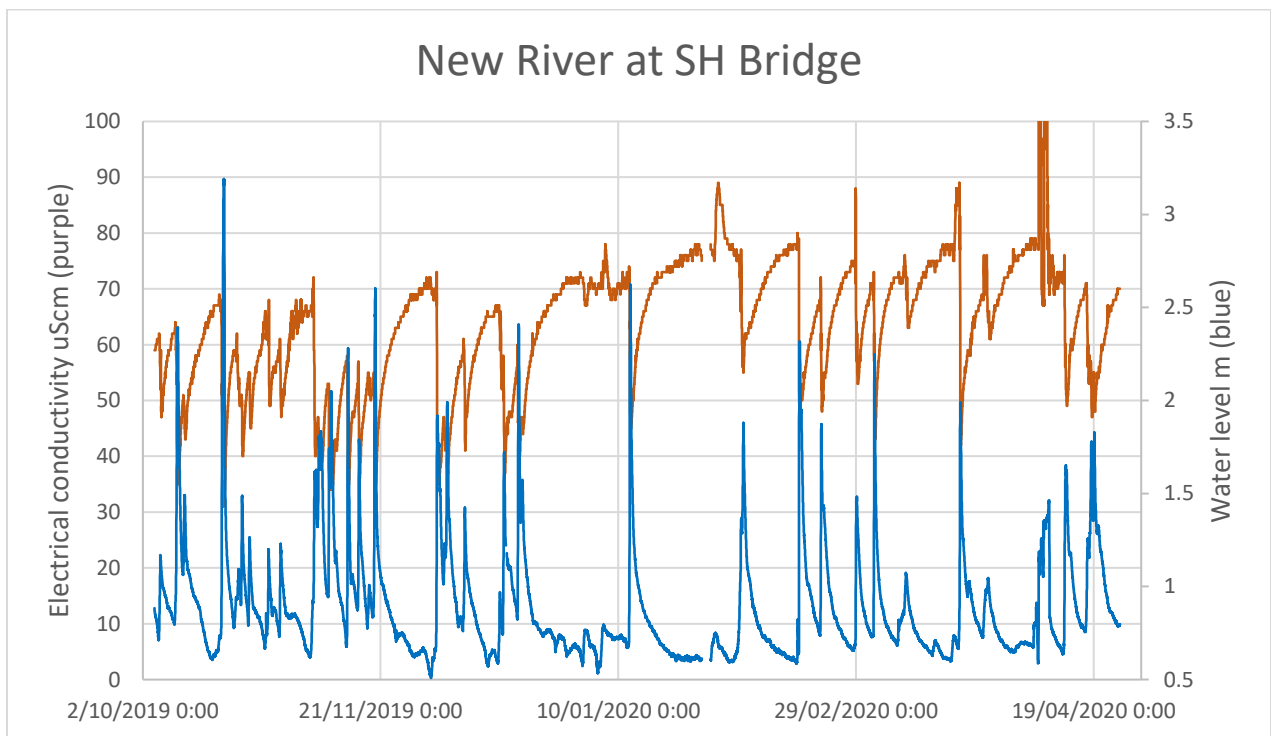


Figure 10: Electrical conductivity and water level of the New River at State Highway Six Bridge October 2019 - April 2020.

Discussion

The year from May 2019 to May 2020 appears to have been a year of frequent rainfall, especially the end of 2019. It likely limited recruitment success but in turn kept the water temperatures cooler through summer aiding in trout growth and put the adult population in good condition for their 2020 spawn.

For the Mawheraiti, being the first year of electric fishing the study streams, we cannot yet gauge how recruitment compares to other years. Our first indication will likely be in drift dives next year, with the number of small trout counted compared to the rest of the large data set. The electric fishing has allowed for comparison between streams types and raised some questions. Notably that the stable cooler stream, O'Malley's Creek, appears to be a productive stream with high spawning numbers and high numbers of juveniles but has potentially a limited food supply with growth rates much slower, from the snapshots obtained from electric fishing. We hope to investigate this more during the next study period.

This year has also raised some concerns of earlier reports, with temperature continuing to be above the recommended levels even with the wet start to the summer. As a whole the Mawheraiti River trout population appears to be around average levels from drift diving data although the timing of the dives appears to have significant influence on the count, with later counts typically result in higher counts. Therefore, it would be beneficial to try to complete two dives next season at each site to allow for comparison and see how the numbers are comparing with previous late season dives.

The Sonde data obtained over the summer fishing season in the New River as a whole was positive with temperature and oxygen levels remaining at ideal levels majority of the summer. Although conductivity and turbidity raise concerns of potential anthropogenic disturbance to the fishery which West Coast Regional council is aware of. It is likely that sonde data will continue to be collected from the New River continually and that should contribute to both better environmental compliance and West Coast Fish and Game understanding the fishery. This year coming it would be beneficial to obtained data on trout population and insect community, by completing fish and invertebrate surveys. Invertebrate samples would be to look at food availability with high turbidity levels potentially resulting in sedimentation and limiting food availability as well as using it as a biological indicator of water quality.

Recommendations

- The council receives this report
- The Mawheraiti trout recruitment monitoring programme continues with additional biological surveys when possible.
- The New River continues to be monitored with the addition of electric fishing and invertebrate samples.
- Continue to work closely with WCRC and encourage them to proactively protect the Mawheraiti River and New River trout habitat considering their duty to do so under Section 7(h) of the Resource Management Act 1991.

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