



Investigation of the Mawheraiti River & the New River Brown Trout Fisheries 2021

*Results from sports fish spawning surveys, electric fishing, drift dives and environmental data collected between May 2020-May 2021 from the Mawheraiti River & the New River
Brown Trout Fisheries*

West Coast Fish & Game Region

Baylee Kersten, Fish & Game Officer, August 2021



Trout captured electric fishing Adamstown Creek, Mawheraiti Catchment in April 2021.

Interim report for: 1115 Sports Fishery Research

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Summary

Fish & Game is carrying out research on the Mawheraiti River brown trout fishery in attempt to better understand the fluctuations observed in the fishery. Already from two years of data collection, greater understanding of the roles different streams play on the fishery and the influence of flooding is being obtained. Lastly environmental data collected has reiterated findings of previous work, with the Mawheraiti River temperature often exceeding desirable levels in summer. Looking at data collected over the last two years in the Mawheraiti catchment, it appears that the recruitment year 2020-21 was a very productive one. This largely has been contributed to a reduction in flooding and their being high numbers of good condition spawners. Research is also being carried out in the New River as it is believed the fishery is in a stunted state. From sonde deployments and electric fishing issues regarding sediment have been identified. Electric fishing has resulted in very few trout being captured and low numbers of macroinvertebrates being observed, likely a result of sediment issues. Staff recommendations are that: The council receives this report. The Mawheraiti trout recruitment research programme continues. The New River continues to be monitored but isn't aligned with the research project in the Mawheraiti. 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.

Introduction

The Mawheraiti River and the 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 showed by 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, hopefully will be identified by work carried out in this project but what is ensured to happen is a better understanding of the fishery will be obtained.

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 from 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, 2016). 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, 2016).

This report is intended to provide an overview on information gathered and reviewed for 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 resource consent processing.

Methods

In 2019, Mawheraiti River tributaries were identified as potential spawning streams and spawning counts were carried out when possible, during the spawning season. Three suitable streams following conformation of significant spawning activity from the counts were chosen to be research streams. The three streams represented a mixture of land uses and stream types. Electric fishing was carried out on the research streams three times between November and May. Temperature loggers were installed 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 2019. 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, providing some scope on what may be limiting the fishery and requires further investigation. In addition to this electric fishing was carried out three times on three potential spawning streams. Three more sites were also electric fished once in attempt to locate a more productive spawning stream.

Results – Mawheraiti River

Spawning Surveys

During the 2020 spawning period three spawning surveys were carried out on the Mawheraiti research streams as can be seen in table one below. In O'Malley Creek the highest density of spawning was observed but given the fish were much larger in Rough and Tumble Creek, its likely similar numbers of eggs were deposited in each stream. Spawning peaked this season in early June with all three sites having their peak count on the 9th of June.

Table 1: Spawning Surveys carried out on Research streams in the Mawheraiti Catchment 2019 and 2020.

Date	Section/ Tributary	Brown Trout	Length surveyed (km)	Trout/km
20/05/19	Rough & Tumble Creek	25	6	4.17
04/06/19	Adamstown Creek	4	1.6	2.50
04/06/19	O'Malley Creek	10	1	10.00
25/06/19	Adamstown Creek	0	1.6	0.00
08/07/19	O'Malley Creek	1	1.7	0.59
2020				
19/05/20	O'Malley Creek	15	1.7	8.82
19/05/20	Adamstown Creek	6	1.6	3.75
19/05/20	Rough & Tumble Creek	4	1.6	2.5
9/06/20	O'Malley Creek	22	1.7	12.94
9/06/20	Adamstown Creek	7	1.6	4.38
9/06/20	Rough & Tumble Creek	10	1.6	6.25
26/06/20	O'Malley Creek	3	1.7	1.76
26/06/20	Adamstown Creek	0	1.6	0.00
26/06/20	Rough & Tumble Creek	0	1.6	0.00

Electric Fishing

The electric fishing of research sites this recruitment year seen a significant increase in the number of juvenile brown trout. The data in graphs only show the number trout believed to be from that year's spawn, not the total number of trout in the stream. O'Malley Creek despite having much higher numbers of fry in November compared to 2019, numbers dropped to similar levels of the previous years in following electric fishes (figure 1). Adamstown Creek and especially Rough and Tumble creek seen elevated levels on the previous season (figure 2 and 3). This season recruitment had similar growth rates to the previous years but again the trout in O'Malley's Creek tended to be smaller.

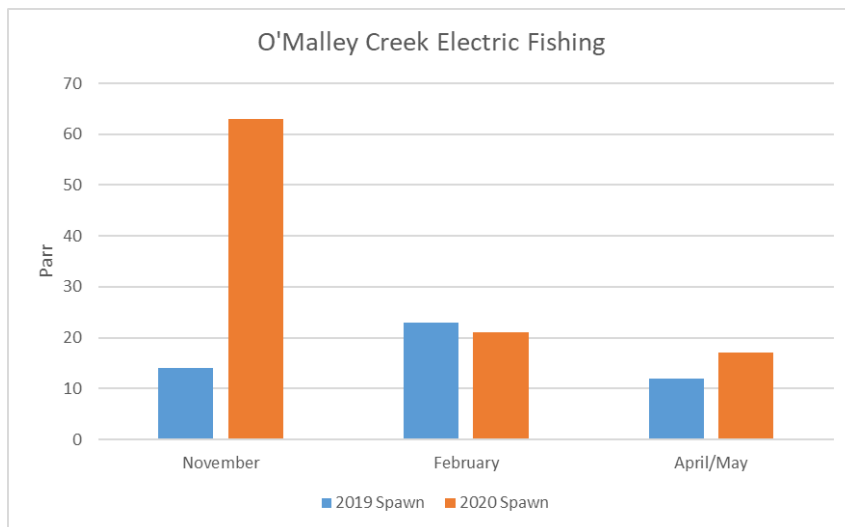


Figure 1: The number of brown trout parr captured from that season spawn electric fishing in O'Malley Creek 2019-2021.

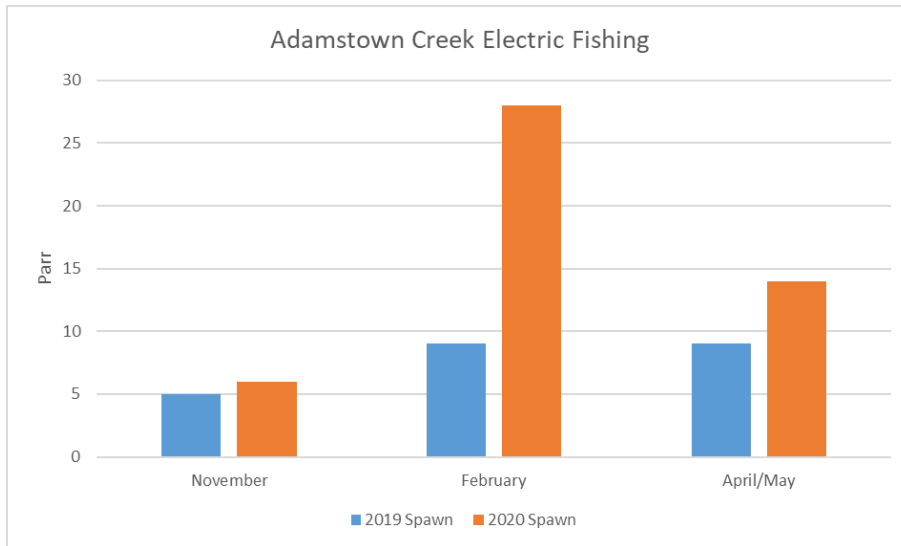


Figure 1: The number of brown trout parr captured from that season spawn electric fishing in Adamstown Creek 2019-2021.

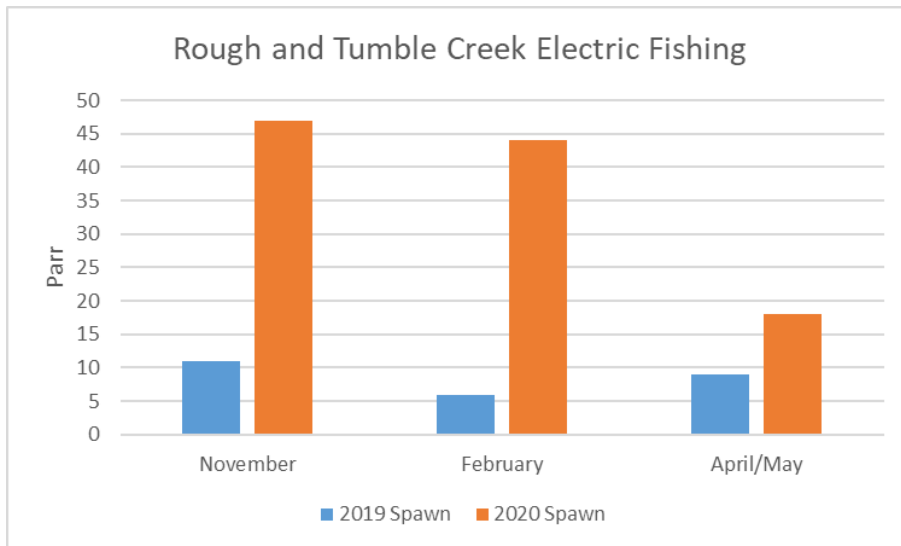


Figure 3: The number of brown trout parr captured from that season spawn electric fishing in Rough and Tumble Creek 2019-2021.

Drift Dives

This year the dives on the Mawheraiti River were completed on the 26 November 2020. The Mirfin's Bridge count was 40 small/km, 72 medium/km and 15 large/km. Numbers of small fish were about average while numbers of medium and large fish were above average. The count was well down on the record count obtained in February 2016 although a significant increase from last season's count. The SH7 bridge the count resulted in 73 small/km, 109 medium/km, and 45 large/km. Numbers of small fish were about average although down on last season while numbers of medium and large fish were above

average. Of note were the number of well-conditioned larger fish seen. There appears to be a stabilisation in numbers post 2016 after the record low numbers recorded 2011-2015.

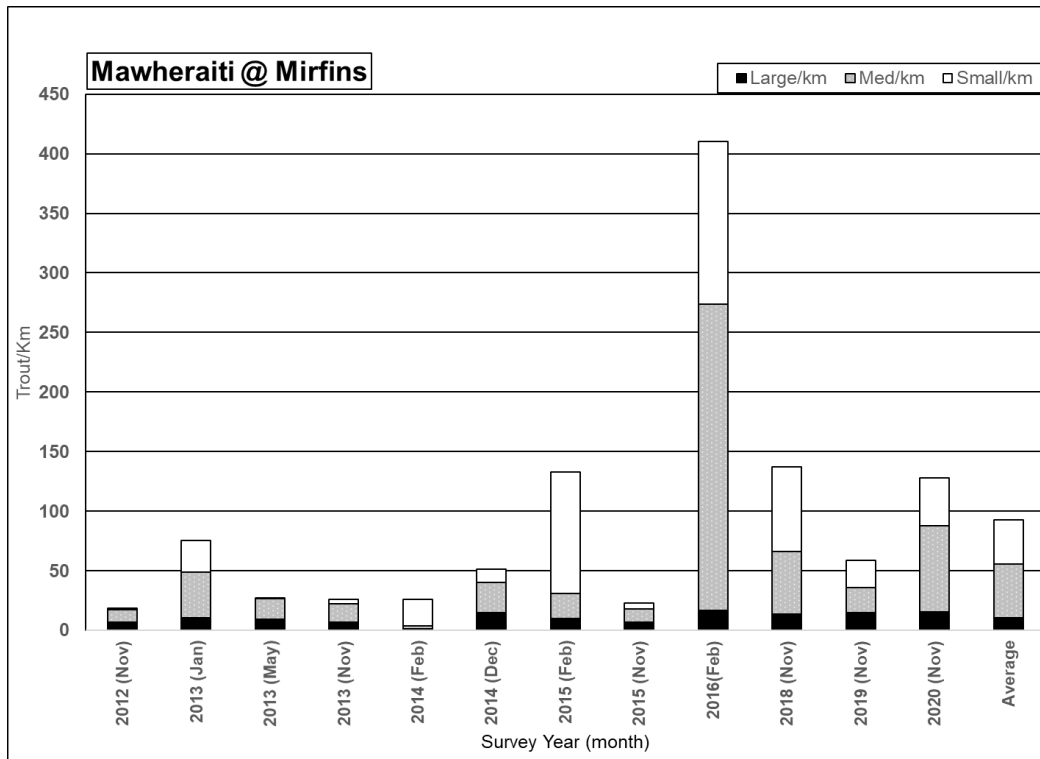


Fig 4: Number of Brown Trout recorded during drift dive surveys at the Mawheraiti River Mirfins Bridge site 2012-2020.

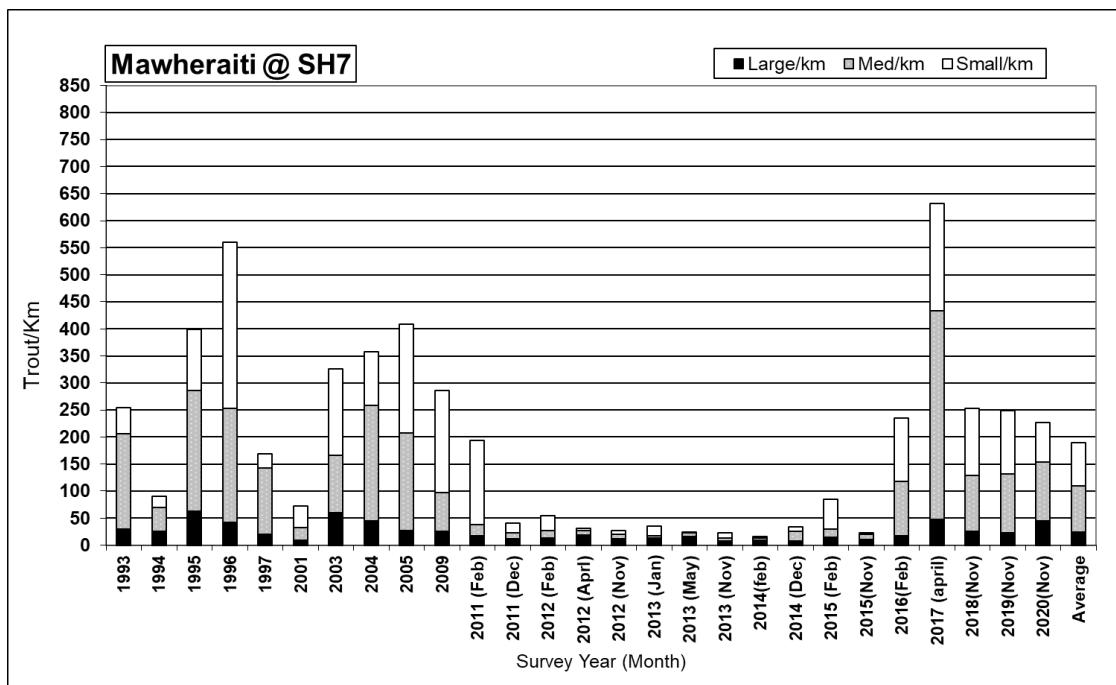


Figure 5: Number of Brown Trout recorded during drift dive surveys at the Mawheraiti River Mirfins Bridge site 2012-2020.

Environmental Data

Cawthron's paper *Water Quality Guidelines To Protect Trout Fishery Values* recommends that temperature does not exceed 19°C to avoid brown trout behavioural disturbances (Hay, Hayes, Young 2006). Below in *figure 6*, it shows the Mawheraiti at Maimai exceeding 19 °C 55 days this season with the hottest temperature recorded being 25.7°C. The day following the peak temperature on the 16th of January a large weather event hit the Coast raising the Mawheraiti to over 250 cumec and plummeting the temperature to 10.1°C providing the trout with relief. For the Maimai site, 19°C was exceeded seven less times this summer than last but the peak temperature was 0.5°C warmer. The downstream temperature site at Atarau data could not be used this year as the temperature probe malfunctioned during the peak of summer.

Research streams temperatures were also recorded either directly or by obtaining data of a stream nearby with similar characteristics. All three streams again 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 like last year never exceeding 19°C, likely a reflection of its dense riparian cover.

The Mawheraiti exceed ten times the median flow 19 days from May 2020 to April 2021. Of the 19 days that exceeded ten times the median flow 14 were during winter or spring – when trout recruitment is most vulnerable. Flood frequency and magnitude was significantly down this year on the previous recruitment year. The Mawheraiti exceeded ten times the medium flow 39 days and 24 during the most vulnerable period last recruitment year. 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)

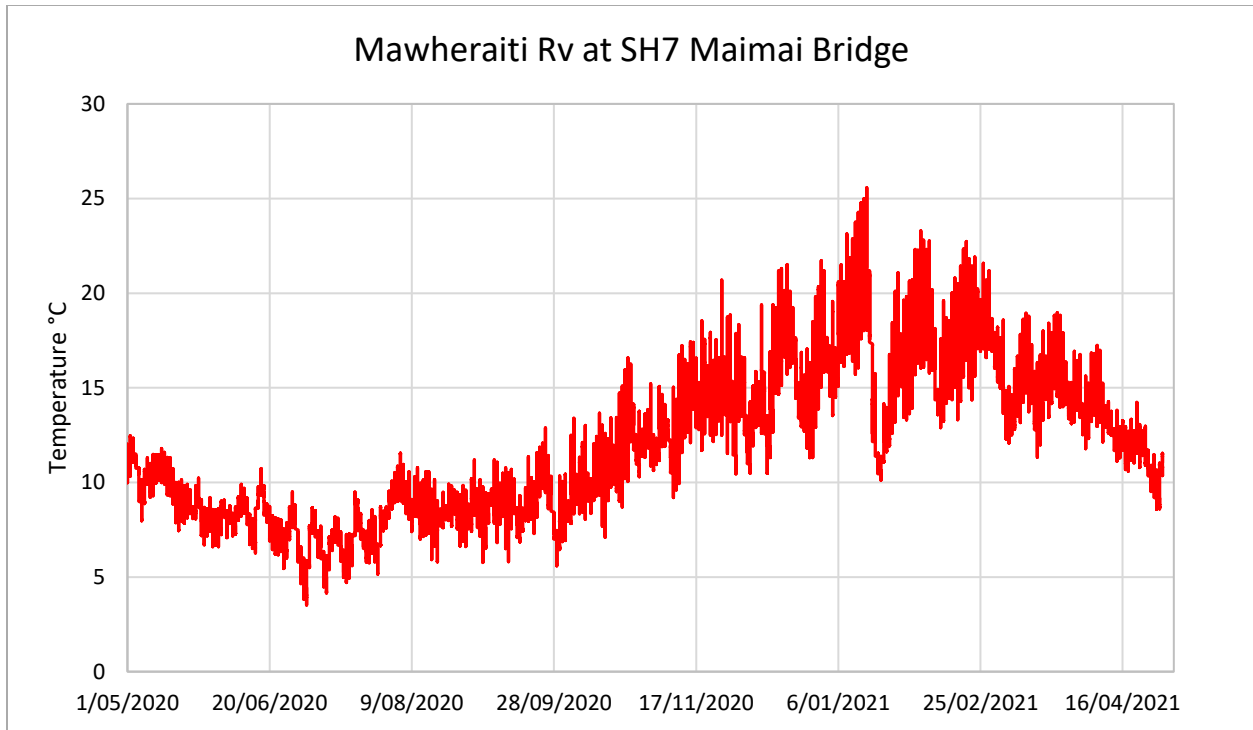


Figure 6: Temperature of the Mawheraiti River at State Highway 7 Maimai Bridge May 2020 - April 2021.

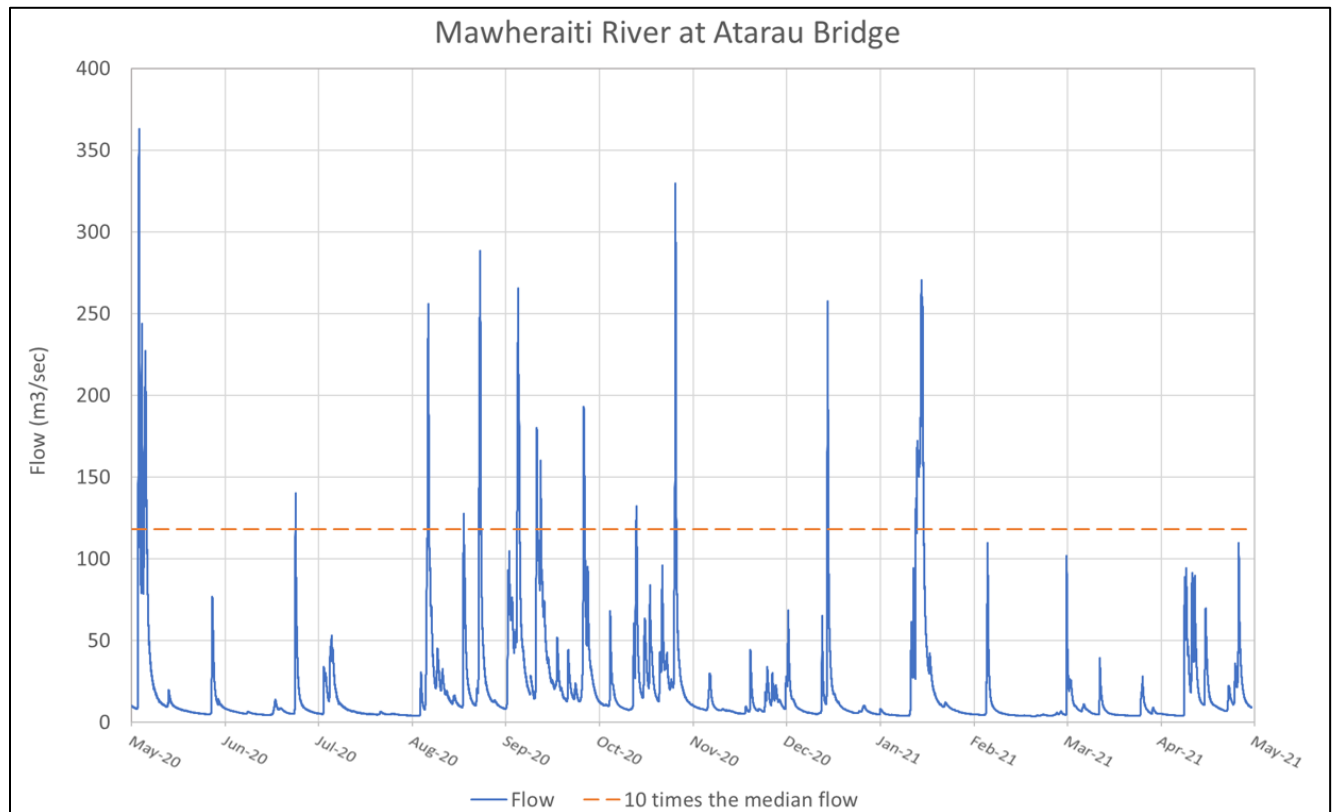


Figure 7: Flow of the Mawheraiti River at Atarau Bridge May 2020 - April 2021.

Results - New River

Electric Fishing

As can be seen below in table 2, four days were spent electric fishing in the New River Catchment during the 2020-2021 research period. The fishing produced high numbers of bullies, torrent fish, eels, and galaxiids but unfortunately very few trout. A few potential negative influences on trout abundance were observed and noted whilst electric fishing. There were very few macroinvertebrates observed on nets compared to Mawheraiti sites when electric fishing. Sediment issues and a lack of habitat for trout was also observed whilst fishing.

Table 2: Electric Fishing carried out in the New River Catchment in 2020-21

Date	Location	Area Sampled (m ²)	No. of trout from this year's spawn	No. trout 1+ years	No. Trout (per m ²)
10/11/2020	Card Creek	240	2	0	0.008
27/01/2021	Card Creek	240	1	0	0.004
07/05/2021	Card Creek	240	1	0	0.004
10/11/2020	Cockabulla Creek	250	0	1	0.004
27/01/2021	Cockabulla Creek	250	1	0	0.004
07/05/2021	Cockabulla Creek	250	1	1	0.008
10/11/2020	New River @ Dungaville	400	2	0	0.005
27/01/2021	New River @ Dungaville	400	0	0	0.000
07/05/2021	New River @ Dungaville	400	2	1	0.008
25/11/2020	Fushsia Creek	150	1	0	0.007
25/11/2020	Nemona Creek	100	0	0	0.000
25/11/2020	Unnamed Creek at Noel Robbs	50	0	0	0.000

Sonde Data

Figures 8 and 9 below look at water quality parameters 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. The median turbidity for New River was calculated from the Sonde as 2.9 NTU. This is down on last year's median of 5.3 NTU but still well above the recommended level of 0.5 NTU (Hay, Hayes, Young 2006).

Figure 9 graph of water temperature and dissolved oxygen saturation, shows the New River predominately remained below 19°C other than warm spells in January and February where its temperature peaked at 20.8°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 never dropped below the minimum desired range of 80% saturation (Hay, Hayes, Young 2006). Electric conductivity data was also reviewed, as a sudden increase or decrease in conductivity in a body of water can indicate pollution. No

rapid changes were observed in data that raised concerned with conductivity remaining stable only appearing to fluctuate relative to water level.

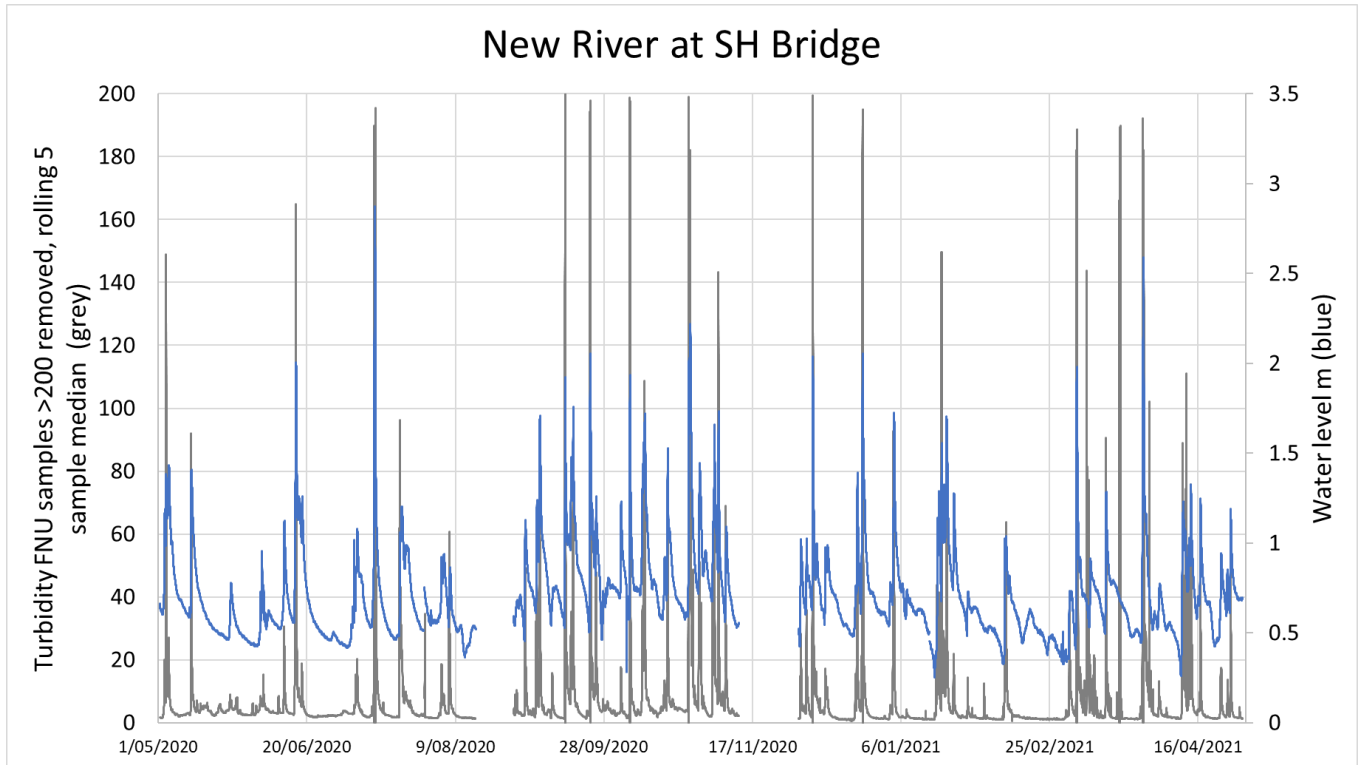


Figure 8: Turbidity and water level of the New River at State Highway Six Bridge May 2020 - April 2021.

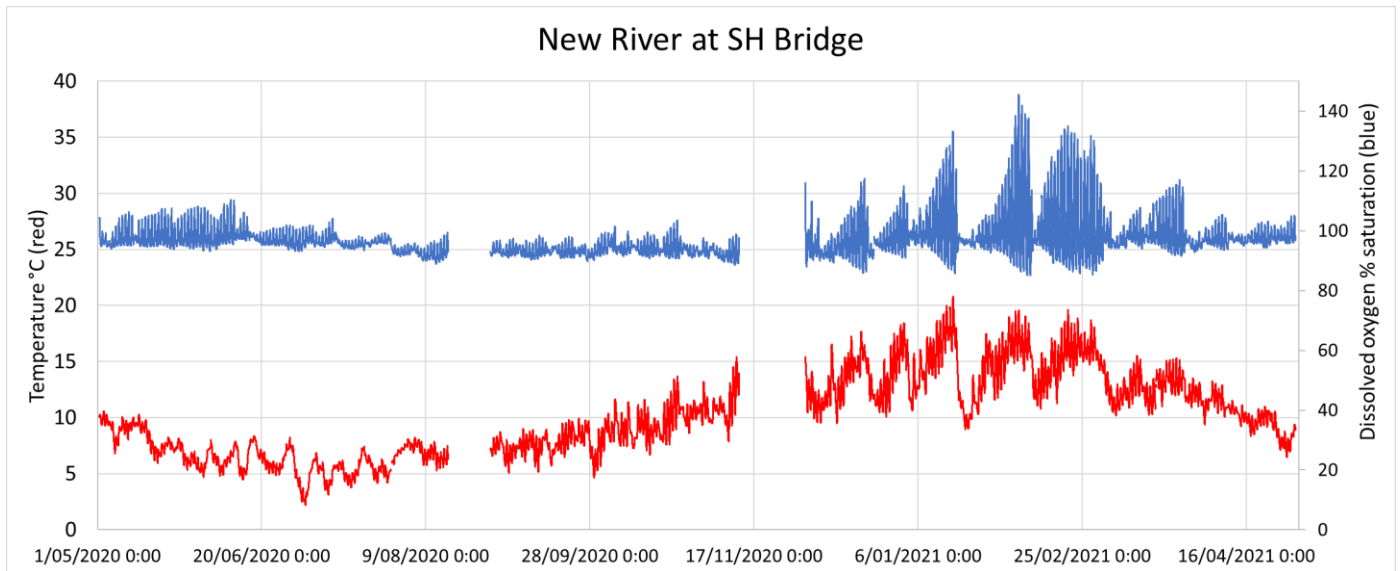


Figure 9: Temperature and dissolved oxygen saturation of the New River at State Highway Six Bridge May 2020 - April 2021.

Discussion

Looking at the data collected over the last two years in the Mawheraiti catchment it appears that the recruitment year 2020-21 was a very productive one. The combination of high numbers of trout in good condition spawning and reduced flooding resulted high numbers of juveniles being observed electric fishing. The true magnitude of success will not be able to be obtained until drift dives counts of the small fish are observed this summer allowing for comparison against the long-term drift dive data set. Already from two years of data collection, greater understanding of the roles different streams play on the fishery and the influence of flooding is being obtained.

The Mawheraiti research streams all had elevated levels of juvenile trout but there appeared to be differing fluctuations between the streams. O'Malley's Creek was full of fry in November, much higher than last year but trout numbers dropped to similar levels to last year by February. Potentially a result of the stream being beyond its carrying capacity with questions already been raised about food availability. This likely resulting in downstream migration but with plenty of optimal habitat below the research site the stream still likely contributes greatly to the Mawheraiti population.

Adamstown Creek research site experienced quite the opposite effect with numbers increasing in February, but this is again likely a reflection of site relative to the spawning area. All spawning observed at Adamstown Creek has been upstream of the research site and with the site having good habitat for juvenile trout its likely they take residence here as they migrate downstream. With trout estimated to be two- to three-year-olds regularly being caught here, it's likely that trout survival to adulthood is higher in this stream.

Rough and Tumble Creek was extremely productive carrying high numbers of juvenile trout right through the summer. As its name suggests, it is by far the most flood prone out of the creeks and this was observed in the previous recruitment year. When returning to the research site between spawning surveys and the first electric fish, the research site was almost unrecognisable, with significant bed movement. This year was much more stable and the electric fishing data is a great reflection of that. Spawning streams like Rough and Tumble Creek are common in the Mawheraiti catchment and may partly explain the boom-and-bust nature of the fishery.

The electric fishing in the New River yielded very few trout, especially when compared to the high numbers observed in Mawheraiti research sites. There have been good numbers of native fish captured but this is likely due to their higher tolerances of water quality issues and the proximity to the sea. Their presence should aid in getting support in improving water quality. Looking at Freshwater fisheries database records, of the 48 entries for the New River, trout were only recorded as being detected 16 times. The peak electric fishing count was of 10 trout captured by NIWA in 1986 and just happens to be at the Cockabulla site where we also have been electric fishing. What the electric fishing has shown is there is low trout numbers in head waters of the catchment and looking at historic data the numbers were never very high. Given the very low number of fish to monitor in each stream, it leaves the streams unfit for research with not enough fish to monitor to draw any solid conclusions. Therefore, rather than carrying out research in the New River, West Coast Fish and Game efforts should be reduced to monitoring the New River.

Annual electric fishing and the occasional spawning survey would likely be more appropriate for monitoring the New River as we work closely with West Coast Regional Council (WCRC) in hope of

improving the New River whilst leaving flexibility to explore the catchment. The assistance of WCRC in both their sonde deployments in the New River and assistance when carrying out electric fishing has been invaluable. The sonde turbidity data has confirmed original concerns that sediment is playing a large part in limiting the fishery. It is positive to see that the median turbidity has dropped significantly from last year, potentially the result of already increased compliance efforts in the catchment by WCRC, but further improvement is still needed. There being low numbers of macroinvertebrates is likely also a reflection of the water quality and sediment issues. When there is a reduced food availability and limited visibility are combined it creates a very unfavourable environment for drift feeding trout (Hay, Hayes, Young 2006).

Recommendations

- The council receives this report.
- The Mawheraiti trout recruitment research programme continues.
- The New River continues to be monitored but isn't aligned with the research project in the Mawheraiti.
- 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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Appendix 1: Location of research sites in the Mawheraiti Catchment.



Appendix 2: Location of research sites in the New River Catchment.

