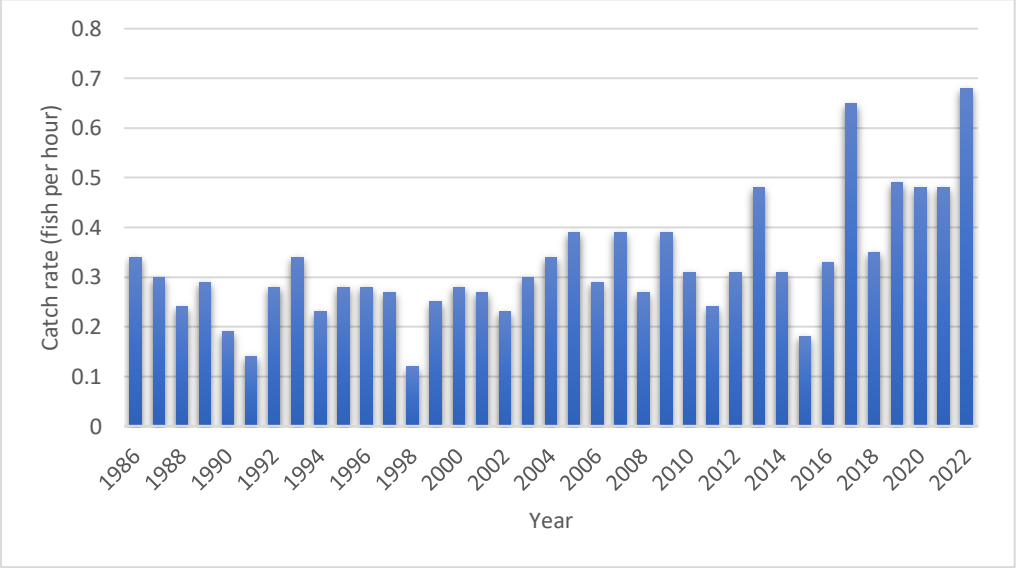
November 2022 Technical update

This report summarises the three key monitoring programmes conducted over winter to better understand the adult populations in the main spawning tributaries of Lake Taupo. Results from creel surveys, drift dive counts and the Waipa fish trap are detailed below.

Tongariro River creel surveys

The Tongariro River has been surveyed since 1957. The overall estimated catch rate for the 2022 winter season was calculated at 0.68 fish per hour (1 legal sized trout every 1 hour & 28 minutes) based upon 352 interviews. This is the highest catch rate calculated for the Tongariro out of the last 28 years and is similar to the second highest peak observed during 2017 (Fig.1). Catch rates have generally improved during the last three decades with improved methods and a better understanding of the fishery.

Figure 1. *CPUE (per angler) for the Tongariro River between winters 1985 & 2022.*



During each creel survey, any trout that have been caught and kept by anglers are weighed, measured, sexed and their maturity identified by fishery staff. A total of 58 rainbows were measured and weighed by staff this winter on the Tongariro and these fish averaged 524mm and 1.8kg (4lbs) with an overall condition factor of 43.9. The rainbows this year were the longest and heaviest since 2006 and were in excellent condition especially during the early part of the season (Figs 2&3). It is encouraging to see the average length rise above 500mm during the last 5 years and the average weight exceed 1.5kg after the low point observed during 2011. The heaviest trout weighed during the angler surveys was a jack measuring 630mm and weighing an impressive 3.25kg (7.2lbs) with a condition factor of 47, caught at the Boulder Reach in the upper section of the Tongariro.

During season 2022, there were 107 trout recorded as caught and kept by anglers interviewed on the Tongariro (16.8% of total catch). In addition to these trout, a total of 473 legal sized trout (74.3%) were also caught and returned to the water alive. Finally, 57 undersized trout were recorded as being caught and returned which equates to 8.9% of the total recorded catch

which is relatively low but probably a result of the minimum size limit being reduced to 35cm during recent years. Overall, 81.6% of the legal sized catch on the Tongariro River during winter 2022 was returned to the water alive.

Figure 2. *Average lengths of rainbow trout kept by anglers fishing on the Tongariro River since 2003.*

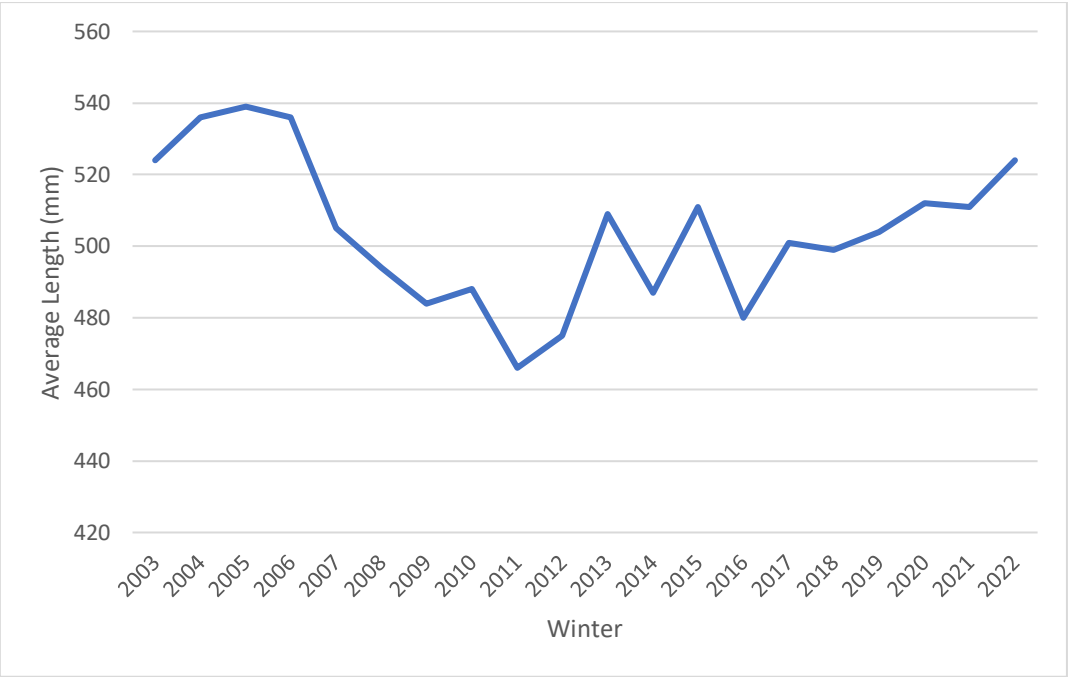
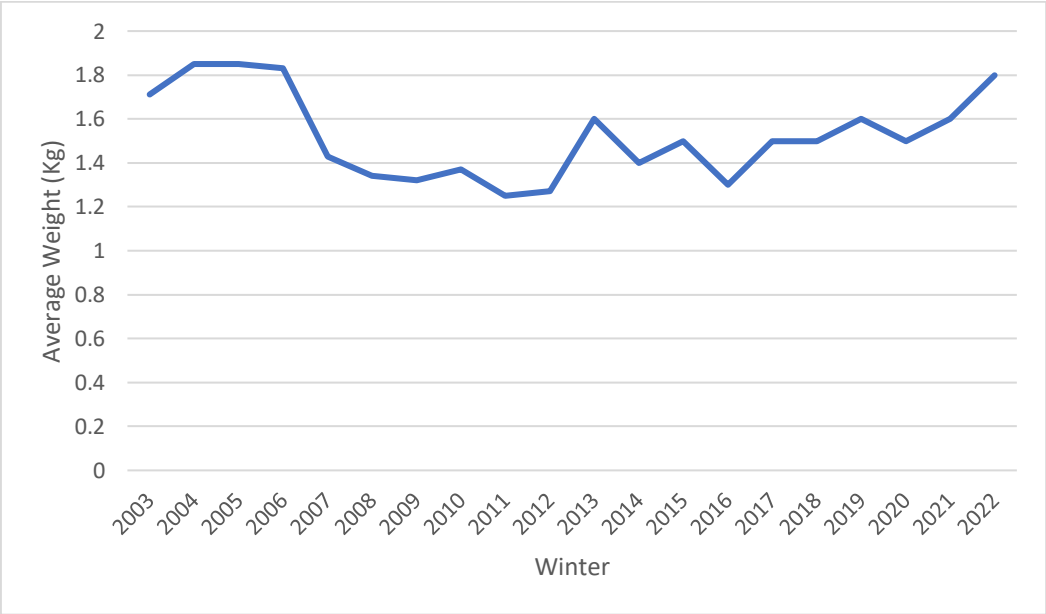


Figure 3. *Average weights of rainbow trout kept by anglers fishing on the Tongariro River since 2003.*



Anglers still favoured upstream indicator nymphing techniques with 69.1% of anglers interviewed on the Tongariro River using this method. This was followed by wet liners using sinking lines on 21.4%, euro nymphing on 5.4% and spey on 4%.

As part of the angler creel surveys, anglers are asked four questions pertaining to their satisfaction with the angling they have had in that particular season. Questions are based upon the size and quality of the fish that they are catching, their angling success and their angling enjoyment. Anglers are asked to rate the first 3 questions on a Likert type scale from 1 to 10 (where 1 is terrible and 10 is excellent).

On average, anglers rated the size and quality of the fish that they were catching this season at 7.9 out of 10. The average score has remained above 7 since 2019 and mirrors the significant improvement observed in average size, weight and condition during recent years.

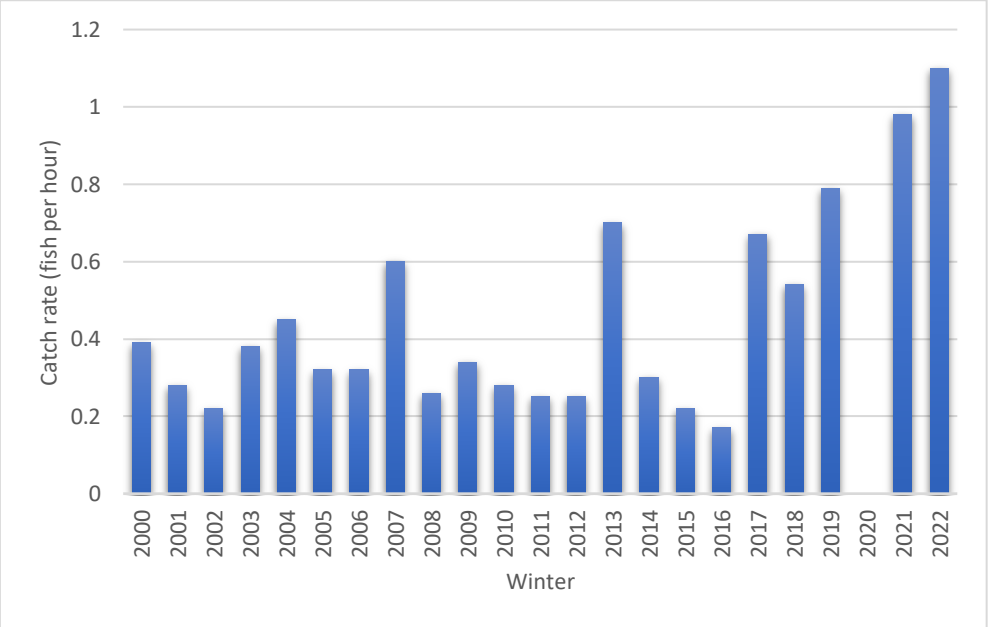
Anglers rated their angling success at 7.1 out of 10 which is also on par with recent years and consistent with the solid catch rates observed during recent years. With an improvement in fish size and quality combined with some very good catch rates, it was not surprising to see an average angling enjoyment score of 9.4 out of 10. The average score has remained above 9/10 since 2008 which saw poor catch rates and poor fish.

Anglers were also asked a final question about whether anything detracts or spoils their fishing while out on the Tongariro River. Just over 56% of anglers asked couldn't think of anything that detracted from their angling enjoyment. As expected, bad manners and poor etiquette (13.6%) formed the majority of the complaints this year and is consistent with what we have observed during previous years. Overcrowding (12.2%) was a close second and is often an issue along with poor etiquette.

Tauranga Taupo River

The Tauranga Taupo River has been surveyed intermittently since 1958 and routinely since 1992. During 2022, the TT River produced an excellent catch rate of 1.1 fish per hour (1 legal sized fish every 54 minutes) based upon 100 angler interviews. This was the highest estimated catch rate out of the last 22 seasons (Fig.4).

Figure 4. *Average estimated catch rates for the Tauranga Taupo River since 2000.*



A total of 27 rainbows were recorded as caught and kept by anglers during the 2022 winter on the TT River. These rainbows averaged 516mm and 1.7kg (3.7lbs) with an overall condition factor of 45.1. The heaviest rainbow was a jack measuring 650mm and weighing 3.15kg (~7lbs) caught nymphing between Maniapoto's and Kereru lodge. In comparison to recent years, these rainbows are very similar to those from winter 2019, but not quite as good as those from the recent peak during 2017 or those trout from 2004/05 which averaged 1.9kg (4.2lbs). Nevertheless, it's good to see average lengths remain above 500mm during the last 6 years and average weights approaching 1.8kg (Figs 5&6). The average condition of the fish this winter was excellent at 45.1 and the highest since 2017. Overall, it is the second highest average score since 2002.

Overall, Tauranga Taupo anglers recorded that they caught and kept 41 trout (11.4% of the total catch). Anglers also caught and returned 318 legal sized trout (88.6% of total recorded catch). No undersized trout were recorded as being caught during the angler interviews. TT anglers released almost 89% of their legal sized catch this winter.

Figure 5. *Average length of rainbows kept by TT anglers during winters 2002 to 2022.*

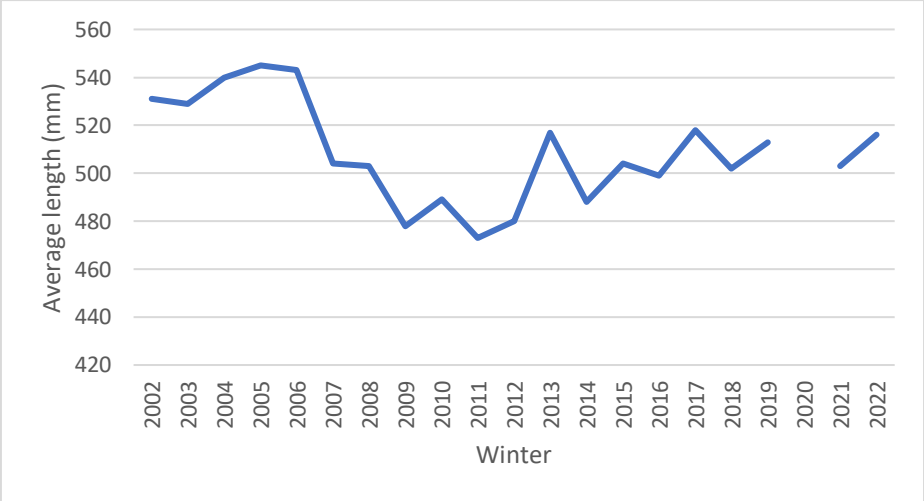
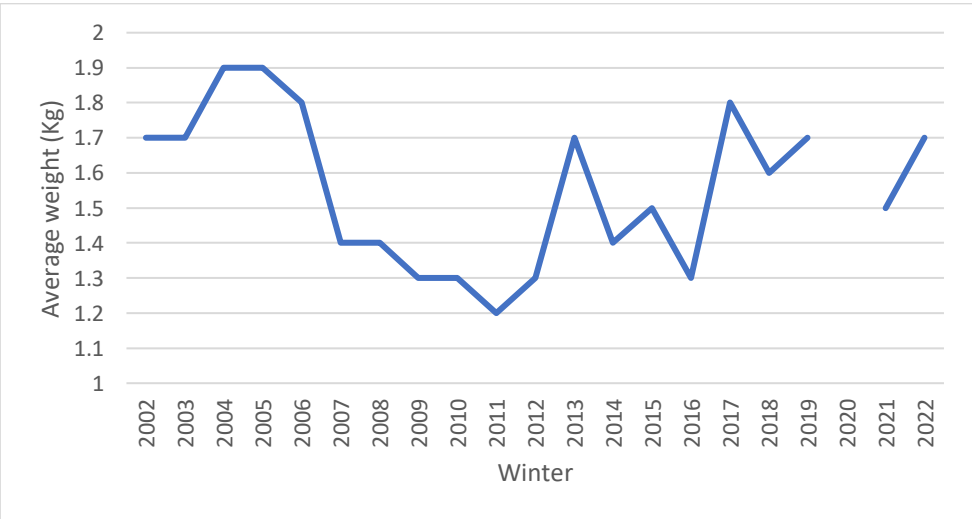


Figure 6. *Average weight of rainbows kept by TT anglers during winters 2002 & 2022.*



Upstream indicator nymphing was the preferred method of fishing the TT during the winter of 2022 and accounted for 70.3% of interviews. This was followed by wet lining on 16.2% and euro nymphing on 13.5%. A 10% increase was observed in euro nymphing this winter in comparison to last winter.

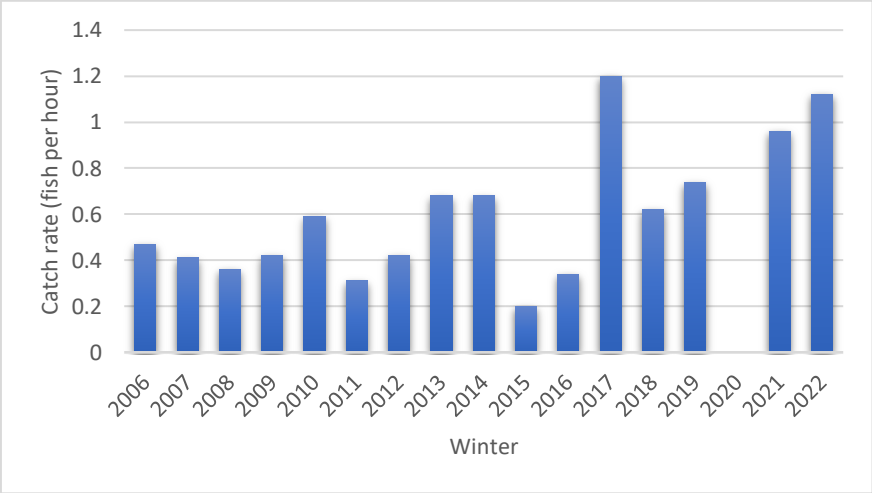
On average, Tauranga Taupo anglers questioned this winter rated the size and quality of the fish that they were catching at 7.7 out of 10, their angling success at 7.0 out of 10 and finally their angling enjoyment at 9.1 out of 10. Average scores for size and quality peaked at 8/10 during 2017 and coincided with the highest average lengths and weights observed during recent years. This year's score is on par with that from last winter. This year's angling success score of 7.0/10 is similar to recent years but behind the peak of 7.2/10 calculated during 2021. The estimated catch rates for winters 2021 and 2022 (0.98 & 1.1 fish per hour, respectively) are the highest out of the last 17 years. Over the years, average enjoyment scores have averaged between 9/10 and 9.7/10 with this year's average of 9.1 not quite reflecting the very high catch rates and the size and quality of the trout during winter 2022.

The sample of approximately 100 anglers were also asked a final question about whether anything detracts or spoils their fishing while out on the Tauranga Taupo River. 73.2% of anglers couldn't think of anything that detracted from their angling enjoyment. The main detraction was overcrowding (7.2% of anglers interviewed) and there were times this season that the main car park was full with 20-30 vehicles parked up! The very wet winter and frequent flood events made for some very good fishing conditions as the river started to clear which resulted in some very popular and productive days on the river. Bad manners and poor etiquette followed with 3.1% and aligns with the overcrowding. Overall, almost three quarters of anglers asked were very happy on the TT River with only a handful of anglers complaining this season.

Hinemaiaia River

The overall estimated catch rate for the Hinemaiaia River during season 2022 was calculated at 1.12 fish per hour (1 legal sized fish every 54 minutes) based upon 160 angler interviews. This was the highest estimated catch rate since the peak of 1.2 fish per hour calculated during 2017 and the second highest on record (Fig.7). These are the only two years where an average of 1 legal sized trout is caught in under an hour. Insufficient interviews were completed during 2020 due to Covid-19 lockdowns.

Figure 7. *Average estimated catch rates for the Hinemaiaia River since 2006.*



A total of 26 rainbows caught and killed on the Hinemaiaia River during 2022 averaged 520mm & 1.7kg with an overall condition factor of 43.2. These rainbows were the heaviest on average since the 2005/06 peak which saw rainbows average 2.2kg (Fig.9). The heaviest trout caught was a jack measuring 560mm and weighing 2.4kg (5.3lbs) caught euro nymphing downstream of the SH1 bridge during mid-July.

Figure 8. *Average length of Hinemaiaia kept trout between winters 2002 & 2022.*

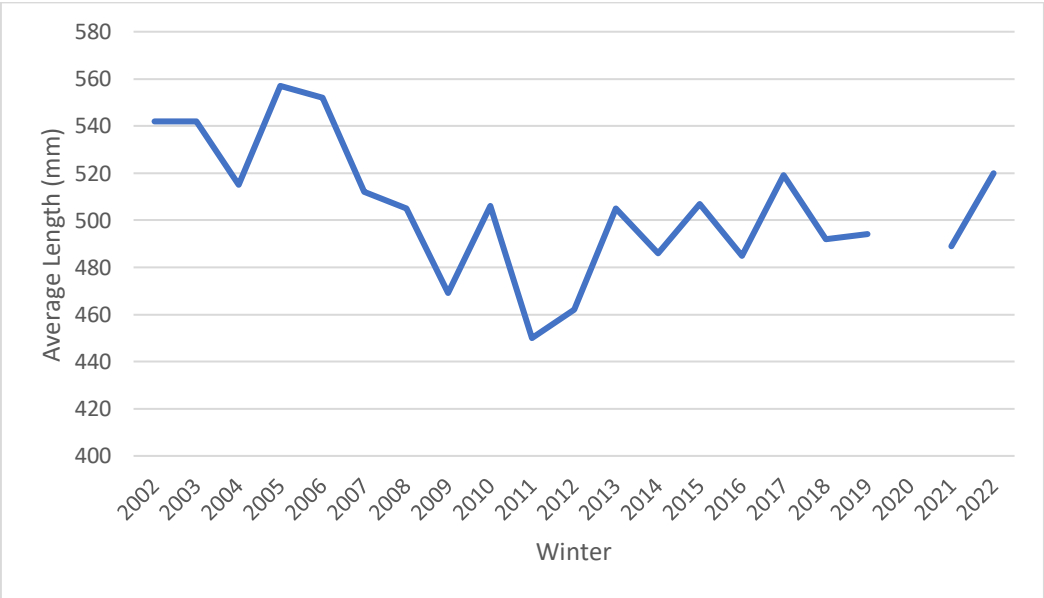
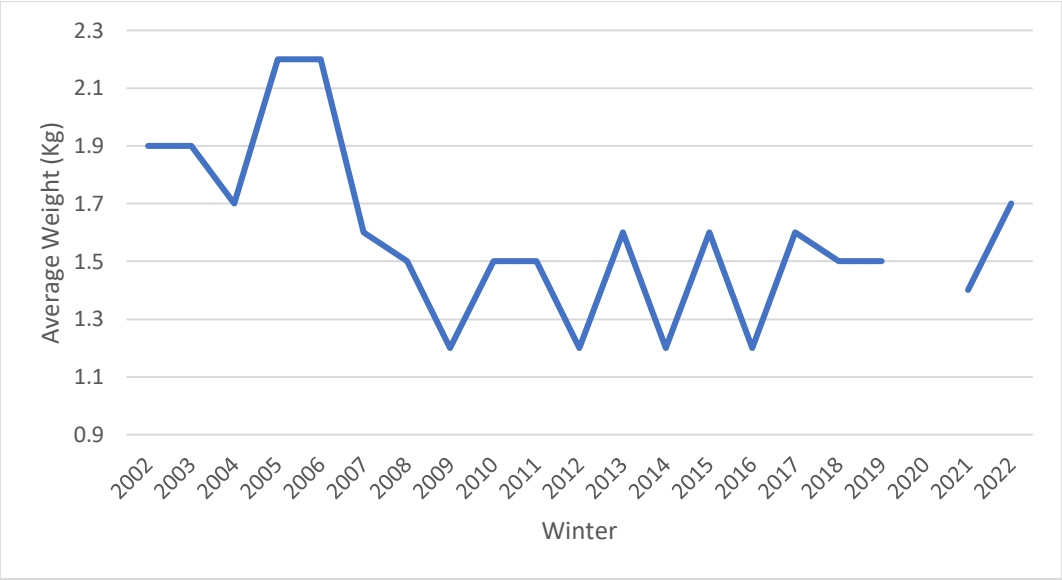


Figure 9. *Average weight of Hinemaiaia kept trout between winters 2002 & 2022.*



Hinemaiaia anglers reported catching and killing 46 trout this winter which equates to 15.9% of the total recorded catch. A total of 230 legal sized trout were also recorded as being caught and released (79.6% total recorded catch) while a further 13 were caught and released as they were undersize (4.5% total recorded catch). Overall, Hinemaiaia anglers chose to release 83.3% of their catch that was of a legal size.

Upstream indicator nymphing was still the preferred method of fishing the Hinemaiaia River during the winter of 2022 and accounted for almost 80% of all interviews. Euro nymphing was the second preferred method on almost 17% followed by wet lining on 3.6%. Euro nymphing was most popular at the Hinemaiaia when compared to the Tongariro & Tauranga Taupo rivers this winter.

Overall, Hinemaiaia anglers questioned during the angler surveys rated the size and quality of the fish that they were catching at 8.1 out of 10, their angling success at 7.9 out of 10 and their angling enjoyment at 9.3 out of 10. The average score for fish size and quality was the highest out of the last 17 years and reflects the size and quality of the fish this winter that were the best since 2005/06. An average success score of 7.9/10 was the highest since the previous peak of 7.4/10 observed during 2017 and reflects the excellent catch rate this winter.

An average enjoyment score of 9.3/10 is consistent with recent years and reflects that a very high level of enjoyment is experienced by anglers on this particular river.

Almost 61% of anglers questioned said that nothing detracted from their angling enjoyment while on the Hinemaiaia River during 2022. Overcrowding was the main detraction cited by almost 10% of anglers this winter. Rubbish, bad manners, snags and “other” were the next popular detractions cited at 6.1% each.

Summary

The 2022 winter fishing season was an excellent one across the three Taupo rivers where surveys were conducted both in terms of the very high catch rates but also the excellent size and quality of the trout being caught. The winter was exceptionally wet with frequent flood events throughout and the rivers running higher than normal. A significant flood of the Tongariro River during August reached over 600 m^3/sec and was followed by a 330 m^3/sec flood in September and a 230 m^3/sec flood in early October. The August and September floods resulted in major changes to the lower Tongariro and a loss of the braided channel near Tongariro lodge. The Bridge Pool was also altered and is now more of a longer run than a pool.

With plenty of water came plenty of fish and the consistent rain events encouraged fresh fish to move into the Tongariro throughout the season. The catch rate of 1 legal sized trout every 1 hour and 28 minutes was the highest on record out of the previous 28 winters, eclipsing the previous peak calculated during 2017. August was the only month where interview numbers were close to 100 and the catch rate was calculated at 1 legal sized fish every 1 hour and 14 minutes and is the second highest monthly catch rate on record, where monthly data exists, and on par with the peak of 1 fish every 12 minutes calculated during August 2017. Upstream nymphing remained the most popular method followed by wet lining. Euro nymphing remained at a similar level (5-6%) to last year. The trout were not only plentiful, but they were the longest and heaviest we have seen since 2006. Anglers returned almost three quarters of their total catch and returned 82% of their legal sized catch which is a concern. The harvest of trout should be encouraged to keep the balance to ensure that we don't see a crash like occurred between 2007 and 2012. Angler satisfaction scores were high this year and reflected the excellent fishing and fish size and quality. Detractions were largely focussed on overcrowding and lack of angling etiquette, consistent with the high numbers of anglers fishing the Tongariro this winter.

The neighbouring Tauranga Taupo River also saw the frequent rainfall and flood events with favourable fishing conditions present throughout the winter. The catch rate estimated for the TT this winter was the highest out of the last 22 winters at 1.1 fish per hour (1 legal fish every 54 minutes) and higher than the previous peak of 0.98 fish per hour (1 legal fish every hour) calculated last year. The rainbows kept by anglers were the best we have seen since 2019 but slightly shorter and lighter than those kept by Tongariro anglers this winter. Upstream nymphing remained the most popular method, followed by wet lining and euro nymphing. Euro nymphing increased in popularity on the TT this winter in comparison to the previous year. Average angling satisfaction scores were consistent with the size and quality of the trout this winter and the high catch rates observed. Almost three quarters of anglers said that nothing spoiled their angling enjoyment overcrowding being an issue for anglers on this river. TT anglers returned 89% of their legal sized catch which is again a concern. The harvest of trout needs to be encouraged to ensure that the trout population remains in check and the average size remains high.

The Hinemaiaia River also experienced some exceptional fishing this winter with an estimated catch rate of 1.12 fish per hour (1 legal fish every 54 minutes) and was the second highest peak observed out of the previous 16 years behind the peak of 1.2 fish per hour calculated during

winter 2017. The rainbows kept by anglers this winter were the longest and heaviest since 2006. Anglers chose to release 83% of their legal sized catch which is consistent with the other rivers surveyed and still rather high in terms of keeping the overall trout population in check. Upstream nymphing was the preferred method used by 80% of all anglers interviewed. Euro nymphing was practiced by 17% of anglers interviewed at the Hinemaiaia River this winter and was the highest percentage out of the three rivers surveyed. Angler satisfaction for fish size and quality and angling success were the highest average scores we have seen out of the previous 16 years and again mirrors the excellent size and weight of the trout and high catch rates observed this winter. Overcrowding on this smaller river was the main detraction with 80% of anglers interviewed preferring the section of river between SH1 and the winter limit.

The significant improvement both in terms of fish numbers and their overall size and condition during recent years is encouraging and we are approaching the glory days of the mid 2000's where fish numbers were plentiful, and the average size of rainbows were approximately 540mm & 1.9kg. However, the rainbow trout population crashed soon afterwards during the late 2000's due to a variety of reasons including a very large adult trout population, huge recruitment of juvenile trout and a lack of smelt to feed the adults and juvenile trout in the lake. We need to ensure that the harvest of trout is encouraged over summer on Lake Taupo and next winter to ensure that the trout population remains in check and can be sustained by the smelt population in Lake Taupo.

Escapement counts

Escapement counts were undertaken on five eastern tributaries of Lake Taupo from August through until October 2022. A total of 12 escapement counts out of 15 (80%) were completed during this period (Table 1).

The winter of 2022 was exceptionally wet with frequent rain and flood events throughout the diving period. This made scheduling dives difficult especially for the larger Tauranga Taupo which requires approximately 10 days to clear after a major rain event. With the peak counts occurring earlier this year and a shortage of staff, no dives were continued into November.

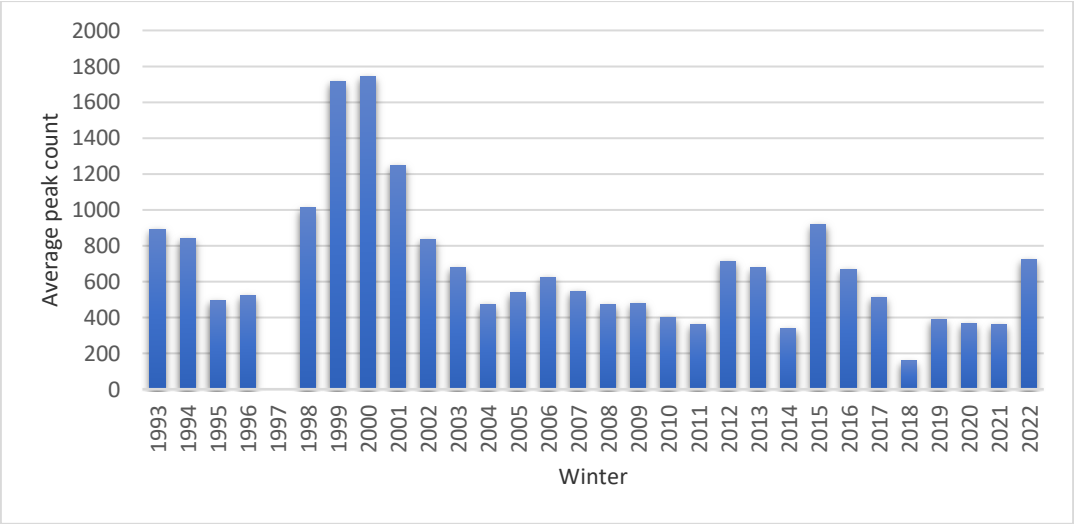
Table 1. *Actual counts of trout in each river during 2022. (Fish per kilometre in parenthesis).*

Month	Tauranga Taupo	Whitikau (Downstream of Grotto)	Waimarino	Waiotaka	Hinemaiaia*
August	1,946 (1,390)	1,000 (500)	903 (410)	825 (434)	847 (770)
September	-	-	1,016 (462)	623 (327)	-
October	1,047 (748)	1,024 (512)	835 (380)	495 (261)	514 (467)
Average	**1,497 (1069)**	**1,012 (506)**	**918 (417)**	**648 (341)**	**681 (619)**

Waiotaka Stream

The Waiotaka Stream was surveyed for the 29th year in 2022 with all three scheduled dives completed this year between August and October. The peak count of 825 occurred during August and equates to 434 trout per kilometre. Counts steadily declined over the next couple of months to 495 in October (261 trout per kilometre). The average peak count of 724 (381 trout per kilometre) taken over the two peak months of August and September is the highest observed since 2015 and the 9th highest on record. Average counts were at their highest during winters 1999 & 2000, with average peak counts of 1,716 & 1,745, respectively. Consistent with last year, it would appear that the runs occurred slightly earlier this year and it would be good to commence drift dive counts in July next year to confirm this. Overall, it would appear that 2022 was a good spawning season for the Waiotaka in comparison to recent years still but well down on the peaks observed during the late 90's and early 2000's (Fig.10).

Figure 10. *Average peak counts over two months on the Waiotaka Stream since 1993.*

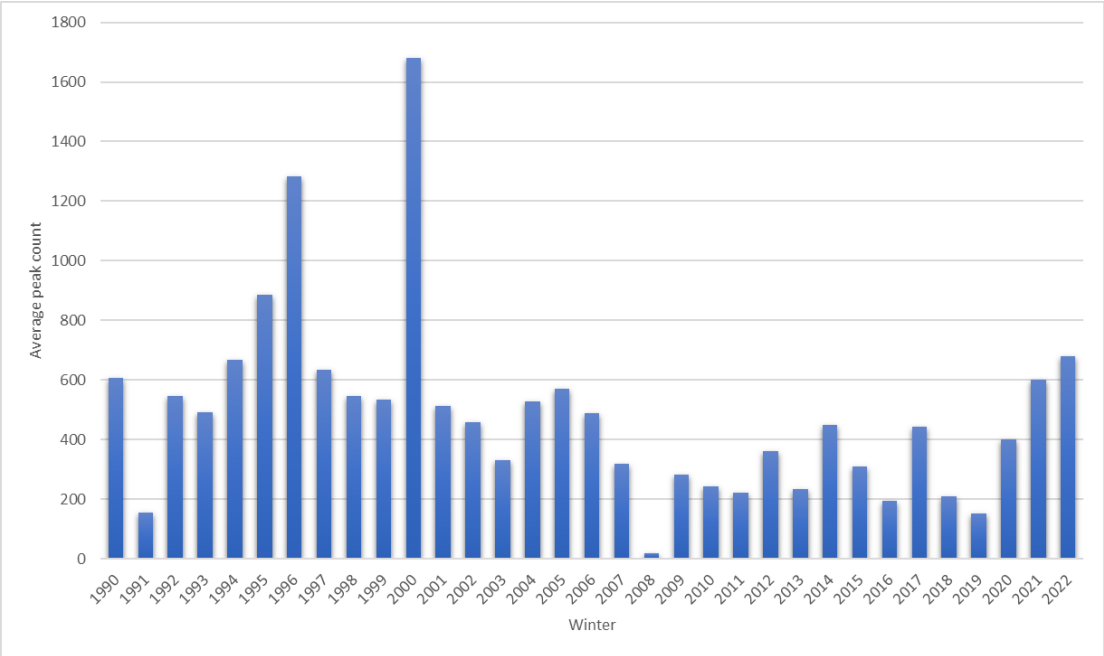


**No dives were completed during 1997*

Hinemaiaia River

2022 saw the completion of the 33rd consecutive year of drift diving the Hinemaiaia River. Only two dives out of three were completed with counts completed in August and October. The peak count occurred during August with 847 trout being counted which equates to 770 trout per kilometre. The average peak count of 681 trout (619 trout per kilometre) was the fourth highest on record behind the peaks of 2000, 1996 & 1995 (Fig.11). Overall, a solid winter for the Hinemaiaia during 2022.

Figure 11. *Average peak counts over the two peak months on the Hinemaiaia River since 1990.*

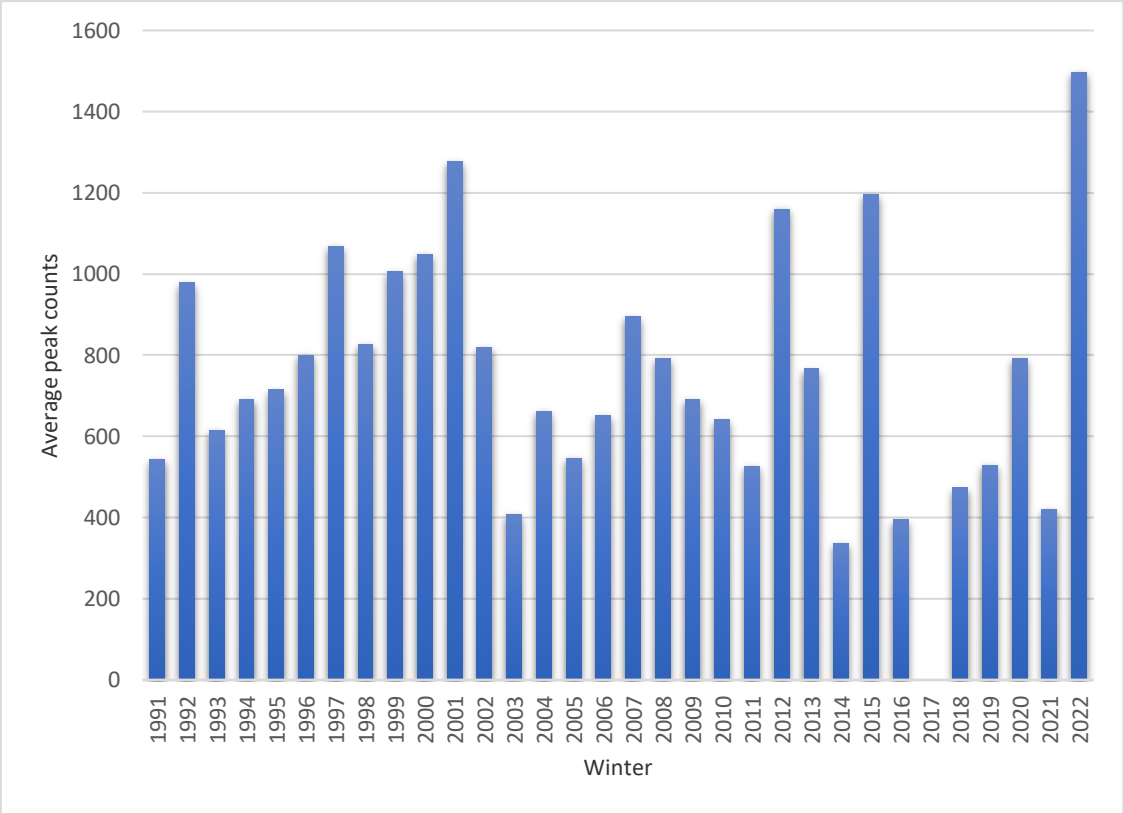


**Only 1 count completed in 2021.*

Tauranga Taupo River

The TT River was dived for the 23rd year in 2022 with 2 out of a scheduled 3 dives completed this year. Dives were completed during August and October with the September dive missed due to unsuitable diving conditions and visibility because of heavy rain and flood events. The peak count occurred during mid-August where 1,946 trout were counted over the 1.4-kilometre section of river. This is the highest monthly count on record and equates to 1,390 trout per kilometre. The second dive was completed in mid-October, but the count had essentially halved to 1,047 trout (748 trout per kilometre). Consistent with previous years, there were still lots of fish out spawning in the shallow run between the end of the dive and the Rangers Pool. The average peak count of 1,497 eclipsed the previous average peak counts observed during 2015 and the early 2000's (Fig.12).

Figure 12. *Average peak counts over two peak months since 1999 in the TT River*.



**No dives were completed during the winter of 2017*

Whitikau Stream

The Whitikau Stream was surveyed from 1991 through until 2020 utilising the 3.9km survey section immediately upstream of the Grotto (Fig.13). Counts in this section are heavily influenced by whether the Grotto itself is blocked by logjams. During 2021, the section downstream of the Grotto down to the Tongariro was counted for the first time since the early 1990's. This section will provide a more robust indication of the count in the Whitikau Stream

regardless of the status of the Grotto. No dives have been completed in the upper section since this change in 2021.

The first dive during 2022 was completed in mid-August with 1,000 trout being counted (500 trout/km). The peak count was made during early-October with 1,024 being counted (512 trout/km).

Figure 13. *Average peak counts over two peak months on the upper Whitikau Stream since 1991.*

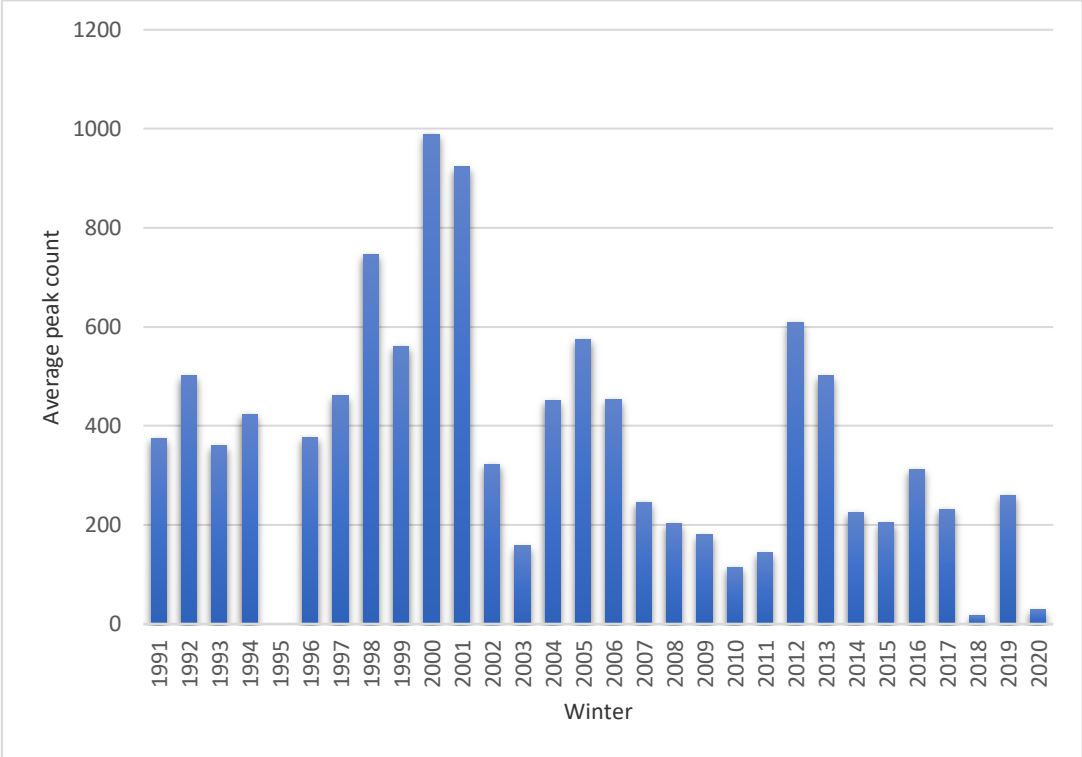
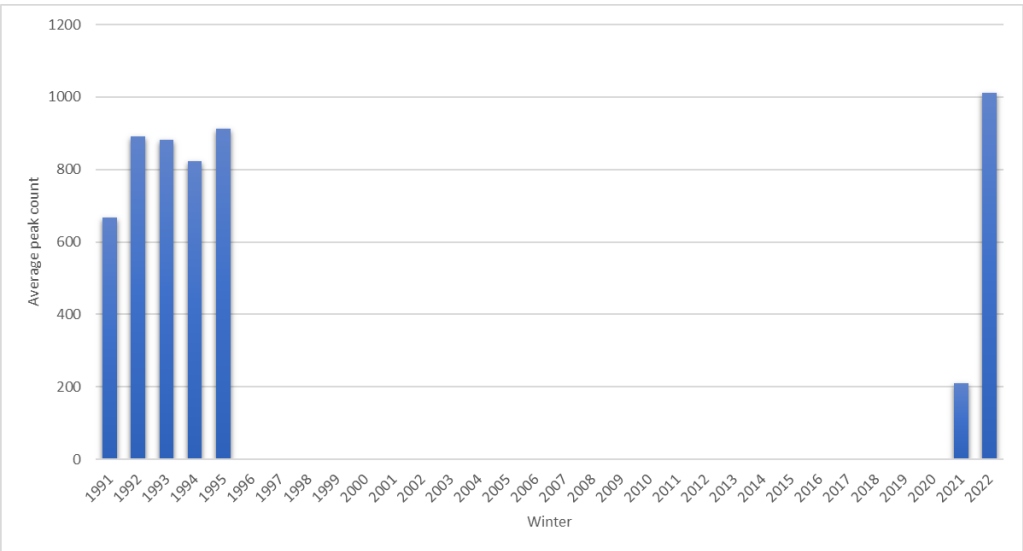


Figure 14. *Average peak counts over two peak months on the lower Whitikau Stream between 1991-1995 and 2021-2022.*

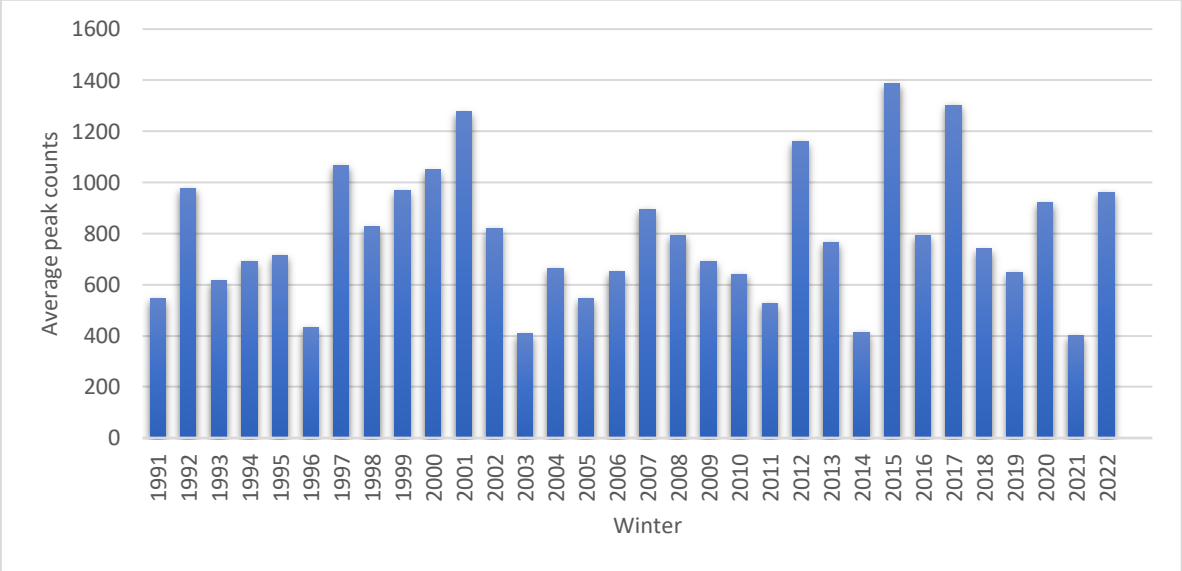


The average peak counts this year were higher than those from the early 1990's and indicate a solid spawning season for the lower Whitikau Stream (Fig.14).

Waimarino River

The Waimarino River was surveyed for the 32nd consecutive year in 2022 with all three scheduled dives completed this year between August and October. The peak count occurred during September with 1,016 trout being counted (462 trout/km). August also produced a solid count of 903 trout (410/km). The average peak counts this winter were the 9th highest on record behind the peak observed during 2015 of 1,386 trout (Fig.15).

Figure 15. *Average peak counts over two peak months on the Waimarino River since 1991*.



Summary

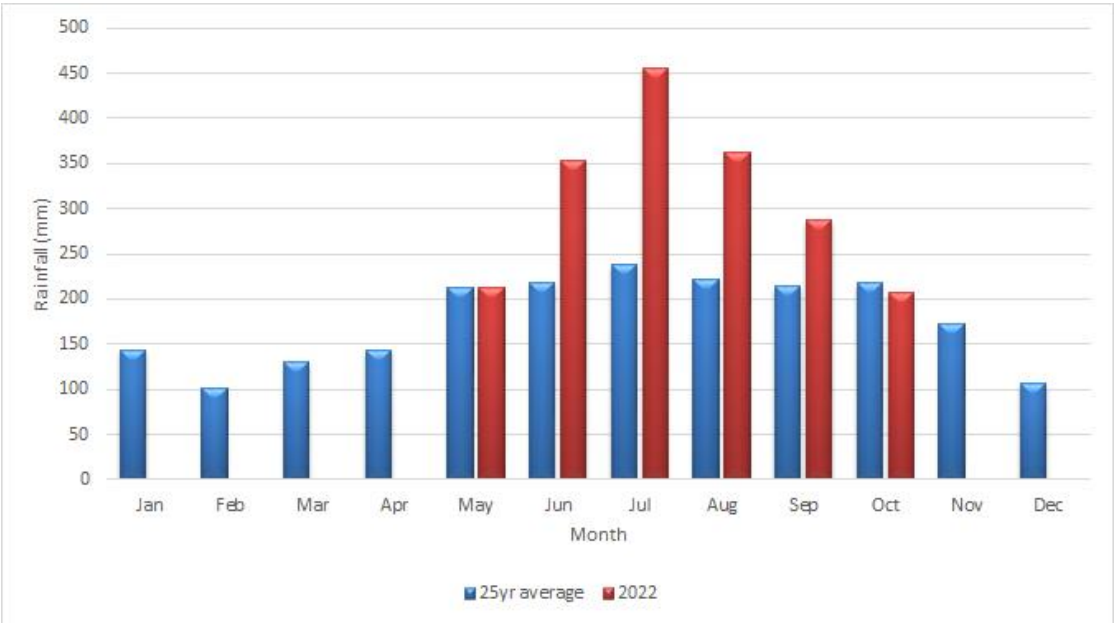
Despite the very wet winter and subsequent marginal visibility, the fish counts that could be completed indicate a solid run of trout into the local tributaries this winter. The Tauranga Taupo, Whitikau and the Hinemaiaia were the stand outs in terms of overall numbers with the highest monthly count ever obtained on the TT this winter. The runs peaked during August and September with October counts well down this year indicating a slightly earlier run this winter.

Waipa Stream fish trap

The Waipa trap was installed on the 2 May 2022 and operated through until 1 November 2022 for the 25th consecutive year. The trap was removed one month earlier this year due to a shortage of staff and other work priorities. A good sample of kelts were processed on the day that the trap was decommissioned for the season. Removing the trap earlier also allowed staff to undertake overdue maintenance and repairs of the timber side walls prior to the start of the 2023 trapping season.

This winter was the second wettest on record in Taupo dating back to 1968. It was deemed to be New Zealand's warmest and wettest winter on record. As a result of this wet weather, the trap experienced 9 significant floods this season and was out of action for a total of 618 hours or just over 3.5 weeks. Monthly rainfall exceeded 200mm every month between May and October which indicates just how wet the winter was (Fig.16). The wettest month was July with a total of 456.5mm recorded and saw the trap in flood on four separate occasions. The driest month was October with 204mm. The average monthly rainfall for 2022 was calculated at 313mm/month which was the second highest out of the last 25 years for the period May to October behind the peak observed during 1998 (322mm).

Figure 16. Average monthly rainfall for Waipa over a 25-year period (1998-2022) in blue, where data exists, and actual rainfall in red for 2022 (May to Oct).



Average size

Brown trout averaged 596mm and 2.9kg (6.4lbs) which is the heaviest since 2017 (2.9kg) and behind the previous peaks of 3kg and 3.3kg from years 2001 and 1998, respectively. The average length this year is comparable with recent years (Fig.17). The longest brown trapped this year was 685mm while the heaviest brown was 5.4kg (11.9lbs). The average condition of the browns was excellent again this year at 48.6 which is the highest out of the previous 25 years of trapping. Female browns alone had an average condition factor of 50.8!

Rainbow trout averaged 515mm and 1.7kg (3.7lbs). The average length has improved slightly in comparison to last year but is comparable with recent years (Fig.18). The average weight is down slightly on the recent peak of 1.8kg (4lbs) observed during 2020 but is the highest since the average of 1.7kg last seen 16 years ago during season 2006. The longest rainbow measured 650mm while the heaviest weighed 3.55kg (7.8lbs). The condition factor of 43.7 is comparable with that of recent years.

Figure 17. *Average length and weight for brown trout trapped since 1998.*

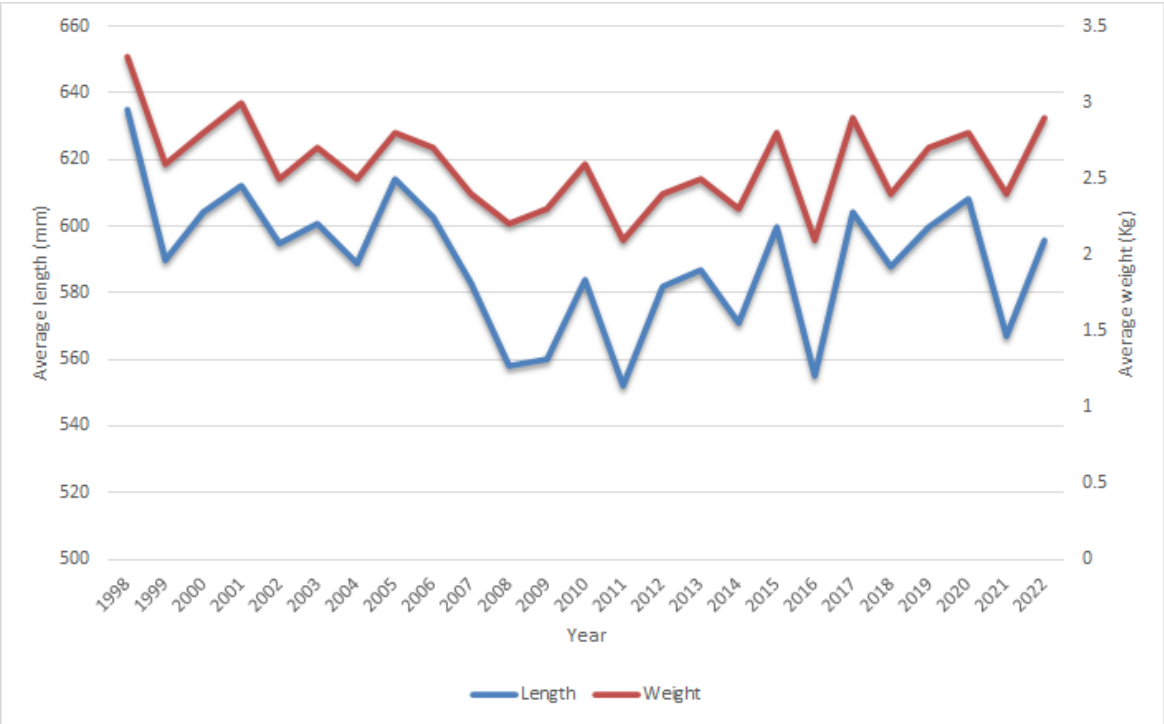


Figure 18. *Average length and weight for rainbow trout trapped since 1998.*

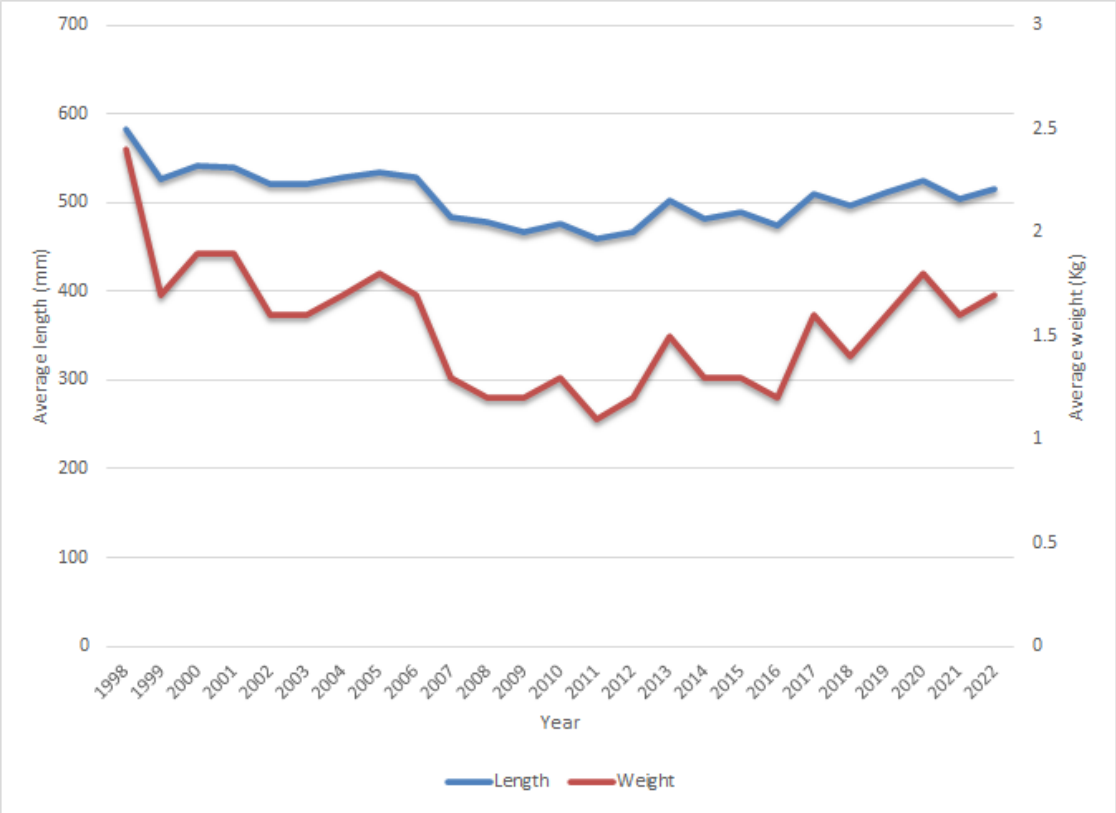


Figure 19. *Length distribution of the brown trout population trapped during 2022.*

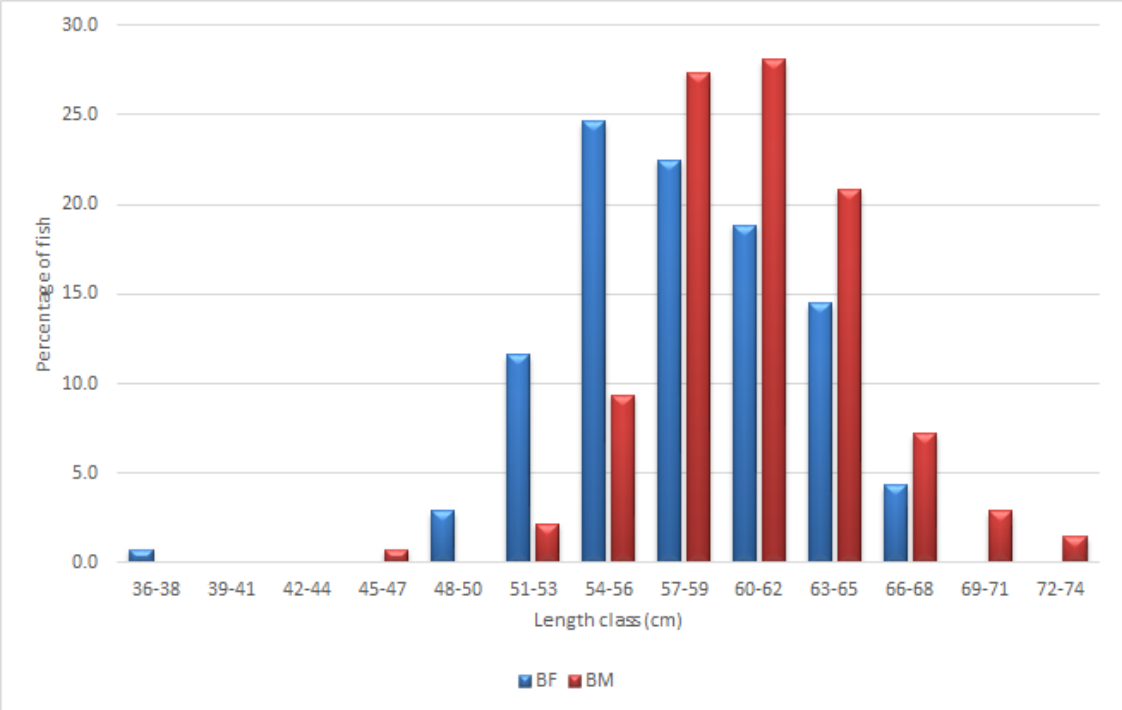
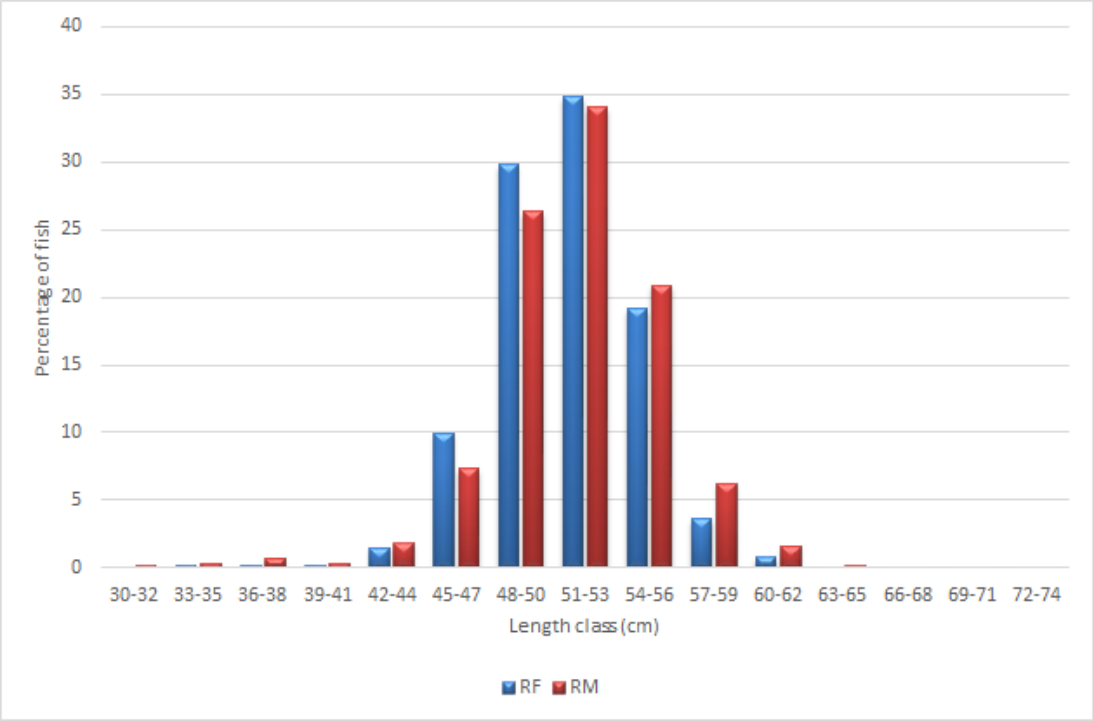


Figure 20. *Length distribution of the rainbow trout population trapped during 2022.*



Age structure

Based upon the presence or absence of fin clips and body characteristics, 89 browns (32.2%) were classed as maidens spawning for the first time. Browns spawning for the second time accounted for 10% followed by third time spawners on 13.8% and fourth and fifth spawners on 8.6% and 5.1%, respectively. Unclipped browns that were deemed to be previous spawners accounted for 30.1% of the actual run. Overall, all previous spawners accounted for 67% of the actual brown run. Only 2 browns (0.7%) could not have their maturity determined.

Approximately 60% of rainbows trapped this winter were classed as maidens followed by those spawning for the second time (10.3%). Third and fourth time spawners accounted for 3.8% and 0.4%, respectively. Only 6 rainbows (0.5%) were spawning for an impressive 5th time. Rainbows that were unclipped but classed as previous spawners accounted for 22.7% of the actual run with all previous spawners combined accounting for 37.8%. A total of 23 trout (2%) were of unknown maturity.

Sex ratio

The M: F sex ratio for brown trout this year was 1:1 while it was 0.9:1 for the rainbow trout population. These figures are based upon the actual run. These tend not to fluctuate much with females generally outnumbering the males and surviving the rigors of spawning better. General trends for both the browns and rainbows show a gradual movement towards a more equal sex ratio since trapping began.

Timing of the run

The brown trout run peaked in June with 46.2% being trapped. Just over 95% of the brown trout run occurred between May & July. The rainbow trout run peaked during September with 24% of the run being trapped. Almost 70% of the rainbow trout run occurred between August and October.

Actual run size

The actual run has yet to be fully adjusted based upon the proportion of clipped kelts trapped on their way downstream. Given that the trap was in flood 9 times during the 6-month period, we have missed a considerable number of fish on their way up as confirmed by the high proportion of unclipped fish trapped in the downstream pen. Early adjustments indicate that the adjusted brown trout run could be up to 3 times larger at approximately 800 browns while the adjusted rainbow trout run could also be 3 times higher at 3,600.

Table 2. *Actual run of brown and rainbow trout trapped during 2022*.

Month	ACTUAL RUN						
	BF	BM	BT	RF	RM	RT	Total
May	31	45	**76**	43	34	**77**	**153**
Jun	66	62	**128**	61	65	**126**	**254**
Jul	34	26	**60**	80	87	**167**	**227**
Aug	7	5	**12**	126	122	**248**	**260**
Sep	0	0	**0**	153	123	**276**	**276**
Oct	1	0	**1**	145	117	**262**	**263**
Tot	**139**	**138**	**277**	**608**	**548**	**1156**	**1433**

Summary

The 25th consecutive year of trapping this spawning tributary of the Tongariro was certainly a wet one with its fair share of significant flood events. Despite only being operated for 6 months this winter, the actual run of rainbow trout trapped was the highest since 2017 and that is also with the trap out of action due to flooding for almost one of those months. The browns were in excellent condition this winter and averaged close to 3kg. The rainbows started the season off in excellent condition after a solid summer in the lake averaging 530mm and 1.9kg with the overall average dropping to 515mm and 1.7kg over the winter. September was the peak month for rainbows and May for the browns.