FISHERIES REPORT

NELSON MARLBOROUGH FISH & GAME 2019-20

TITLE PAGE

SUMMARY OF THE SEASON

Nau mai - welcome to the 2019-20 Annual Fisheries Report.

The 2019-20 season had a mix of everything - both good, and not so. Early season there was huge interest in the rodent plague and whether or not there would be huge fish on offer in this region. Unfortunately it did not eventuate to full effect here, though in other regions incredible fishing was on offer for massive trophy fish - and it was deemed to be a 'once in a generation' season. Put simply, there were some magnificent sized fish getting caught, particularly in neighbouring regions.

Locally, it was another stellar season on the R3 front. R3 (being recruitment, retention and reactivation) is a key focus for staff in this region, and we again made some significant gains in all three 'R's'. This region was on track to go better than the previous in terms of licence growth and angler participation, that is, until covid-19 curtailed the latter part of the season.

Of course, Lake Argyle and the Branch/Leatham releases have been hugely popular, and central to the growth we've seen in the past three or so years, accounting for thousands of fish getting caught and many delighted anglers. The annual tag competition was another success, and a large proportion of the trophy fish we regularly release into Lake Argyle get caught.

As usual, a fair amount of staff time gets spent on monitoring the resource, and in some areas the trout population had declined significantly. Two key rivers - the Wairau & Motueka experienced fewer fish, likely as a result of two years of very low summer flows, while other rivers were affected by a fairly turbulent December, where large-scale floods caused significant damage to some fisheries.

Staff have continued to be active on the RMA front, and considerable effort and resources have been spent on the Marlborough Plan, as well as in the Upper Motueka Valley where horticulture has boomed in recent years, and uncertainty remains as to whether the river can support the growth in this area.

Of course, the coming season will be unlike any other for decades, in that there will likely be few (if any) non-resident anglers fishing our waterways. This is a double-edged sword: many residents will be pleased that there will be less foreign anglers fishing our waterways, yet on the other hand, non-resident licence sales account for a significant percentage of income for this region as well as nationally. Not only that, non-resident trout fishing supports a huge guided fishing industry, which is going to have a very lean year indeed - so there will be some significant financial and social implications for businesses and organisations in this industry.

Thanks for reading. the Nelson Marlborough Fish & Game team.

RELEASE PROGRAMME & R3

Our release programme and R3 programme is inextricably linked, and without one we would not have the other, therefore they have been combined in this chapter.

In the past three years (since large scale releases have taken place), the Nelson Marlborough region has become the leading region in terms of licence growth, angler satisfaction and R3 strategy. Central to this is, of course, the hatchery, and regular releases into family friendly fisheries where chance of success is very high.

The 2019-20 season was again busy on the fish liberation front. In the prior season, 3170 trout (1kg+ and predominantly rainbows) were released into enclosed waterways and one or two river systems. This season, 2556 1kg+ trout were released, with 2013 of these going into Lake Argyle and the lower canal, and the remaining fish going into the Branch/Leatham (468) and Rai River (75).

Date	Number	Species	Stage	Size (average)	Tag/Fin Clip	Location	Assessment of effectiveness
3/07/2019	80	Rainbow trout	Adult	2.5kg	Fin Clipped	Lake Argyle	✓achieved objective
13/08/2019	70	Rainbow trout	Adult	3.5kg	Fin Clipped	Lake Argyle	✓achieved objective
27/09/2019	230	Rainbow trout	Adult	1.0kg	Fin Clipped	Lake Argyle	✓achieved objective
27/09/2019	10	Rainbow trout	Adult	4.0kg	Fin Clipped	Lake Argyle	✓achieved objective
27/09/2019	10500	Salmon	Fry	2.5g		Goulter-at Wards pass stm confluence	→ further monitoring required
18/11/2019	14	Brown trout	Various	100g-2.5kg	(Salvage)	Leatham ford at swingbridge	✓achieved objective
18/11/2019	54	Rainbow trout	Various	100g-2.5kg	(Salvage)	Leatham ford at swingbridge	✓achieved objective
18/11/2019	15	Shortfin eels	Various	100g-2.5kg	(Salvage)	Leatham ford at swingbridge	✓achieved objective
20/11/2019	120	Rainbow trout	Adult	1.1kg	Fin Clipped	Leatham River - lower	✓achieved objective
29/11/2019	280	Rainbow trout	Adult	1.1kg	Tagged	Leatham/Branch heli-release	✓achieved objective
13/12/2019	266	Rainbow trout	Adult	1.1kg	Fin Clipped	Lake Argyle	✓achieved objective
13/12/2019	268	Rainbow trout	Adult	1.1kg	Fin Clipped	Lake Argyle / Lower hydro canal	✓achieved objective
19/12/2019	200	Rainbow trout	Adult	1.1kg	Fin Clipped	Lake Argyle	✓achieved objective
19/12/2019	10	Rainbow trout	Adult	4.0kg	Fin Clipped	Lake Argyle	✓achieved objective
16/01/2020	472	Rainbow trout	Adult	1.2kg	Fin Clipped	Lake Argyle	✓achieved objective
16/01/2020	262	Rainbow trout	Adult	1.2kg	Fin Clipped	Lower hydro canal	✓achieved objective
18/01/2020	37	Rainbow trout	Adult	4.0kg	Fin Clipped	Lake Argyle	✓achieved objective
18/01/2020	51	Rainbow trout	Adult	1.6kg	Fin Clipped	Lake Argyle	✓achieved objective
14/02/2020	250	Rainbow trout	Smolt	10-15g	Wild	Collected from Opouri, transported to hatchery	→ further monitoring required
12/03/2020	280	Brown trout	Smolt	10-15g	Wild	Collected from Rainy, transported to hatchery	→ further monitoring required
14/05/2020	30	Rainbow trout	Adult	4.0kg	Fin Clipped	Lake Argyle	✓achieved objective
14/05/2020	27	Brown trout	Adult	4.0kg	Fin Clipped	Lake Argyle	✓achieved objective
14/05/2020	75	Rainbow trout	Adult	3.0kg	Tagged	Rai River at Bulford/Carluke	→ further monitoring required
20/05/2020	750	Salmon	Smolt	140g		Hatchery Race 2	→ further monitoring required

Staff also managed to collect 250 Rai River smolt, as well 280 Rainy River brown trout smolt. These will be grown for future genetic stock and for release. 10,500 salmon fry were airlifted into two Goulter tributaries, and it will be interesting to see if this boosts an existing occasional run of fish into this very ideal water.

As far as an assessment of the various releases effectiveness, any Lake Argyle release is deemed to be a success due to the positive R3 effect (high catch rates, angler satisfaction), and all recent releases into the Branch/Leatham have also been very effective. The Rai River release in May is likely to achieve its objective as we are still in the early stages of monitoring, though there has been a number of tag returns from this release, including one caught near Dalton's Bridge in the Pelorus.

LAKE ARGYLE - R3 AT ITS FINEST

Lake Argyle is now one of the key fisheries for this region, and in terms of providing for R3 values, is our most important fishery. The reason: easy accessibility with high catch rates.

A total of 2013 fish were released into Lake Argyle as part of the R3 programme and marketing initiatives were in place for some of these releases, some of which are detailed below.

TAGGED FISH COMP

Cameron Johnston - major prize winner

Now an annual favourite, this seasons' tag competition was the best yet as shown by the interest levels from anglers. 200 tagged trout were released into the lake prior to Christmas with two $500 Henderson's vouchers on offer, along with other great prizes like rod/reel combo's, lure packs and free licences. A total of 20 prizes were on offer, meaning anglers had a 1/10 chance of a prize each time they caught a fish. Successful marketing in the form of eye catching emails as well as social and print media meant that the lake received considerable attention from anglers once it had cleared up from the December floods, and tags started to roll in.

75% of tags were handed in eventually, and on the same day in late January both $500 vouchers were claimed. Fittingly, we also gave one winner a high-end spinning rod which was extremely well received, as the antiquated rod he was using had a broken tip.

BIG FISH MANIA

Highly influential in 'Lake Argyle mania' are regular releases of huge trophy trout. The great thing about these releases, is that these fish soon get caught, and staff field plenty of reports and pics from delighted anglers who have landed these behemoths.

< 11 pound fish caught by Julie Hill

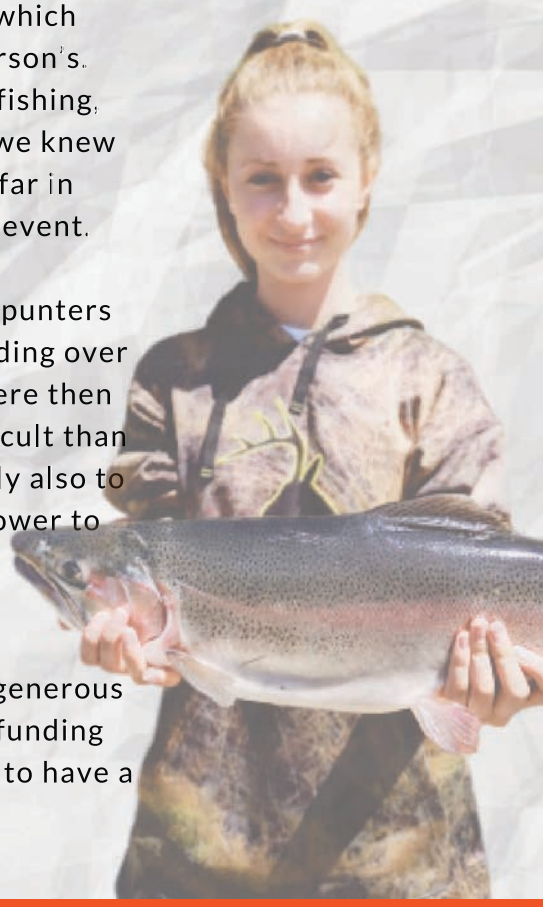
WINTER FISHING

Testament to the popularity of the Lake is the number of anglers who are now fishing there during winter. What used to have virtually nil winter angler effort has now been replaced with regular and busy angling activity, particularly on weekends. A release of 70 oversized trout 4-7kgs was undertaken in mid-May which attracted significant attention on social media and through word of mouth, and subsequently precipitated a rush of anglers to the lake that weekend the likes of which had never been seen before.

Our winter releases in previous years, too, have been highly successful in terms of angler participation at the lake during the winter months, and confirms that regular releases should continue here consistently throughout the year. It is also important to 'reward' those who have purchased winter licences, on the premise they would be provided with ample angling opportunity.

FAMILY FISHING DAY

In January we held our inaugural Family Fishing Day at Lake Argyle which was run in conjunction with DOC Renwick, and sponsored by Henderson's. The purpose of this day was to attract new anglers to the pursuit of fishing, and a free 'educational' day licence was provided to anglers. While we knew this event would be popular, the amount of people that showed was far in excess of what was expected with around 250 anglers attending the event.



The day started with a release of trophy fish into the lake which the punters loved witnessing, before loads of spot prizes were given away (including over a dozen new rod/reel combos, free licences, lure packs etc). They were then set loose to try and catch a trout, which in the end proved more difficult than normal, possibly to the high number of anglers fishing, but potentially also to the fact there was no flow through the lake, as we had asked Trustpower to hold the lake levels high for the duration of the event.

Thanks to co-hosts Renwick Department of Conservation for their huge efforts helping put the day on, Henderson's Ltd for their generous sponsorship, and to Trustpower for providing the facility plus some funding towards the releases and assistance for the day. We were also lucky to have a number of helpers and fishing guides that gave up their time to help.

RANGER IN RESIDENCE

Fish & Game were extremely fortunate to have a dedicated voluntary ranger, Bruce McKenzie, who was employed as a summer advocate for freshwater pest education, as well as compliance and R3. Bruce stationed himself at the lake over New Year and for the following month, and was a fantastic ambassador for Fish & Game, helping dozens of anglers on the way to catch fish, as well as being a great 'point of contact' for anglers at the lake. His rapport he had with anglers was excellent and we received many compliments from anglers who had interactions with Bruce.

"CASE IN POINT"

Case in point is shown in an excerpt from voluntary ranger Bruce McKenzie's compliance report:

"Angler abilities ranged from highly skilled fly fishing, to reactivated anglers utilising sea fishing gear to cast lures. It is clear anglers are becoming more aware of effective techniques as per the 'Argyle Fishing Tips' video available on YouTube. Catches of note include a 4.4kg Rainbow hen on spinning gear. Angler had pulled out his old Toby lure from when he was 10 years old, the paint had been worn off revealing an old bronze looking piece of metal! This proved effective with a trophy hen landed. Angler is 'hooked for life', after moving from North Island to Blenheim for the trout fishing. Second catch was from an angler visiting from Canterbury, utilising shrimp bait. She managed to land a large jack, over the 5kg mark and chose to release, stating "He's a good breading fish!"

BRANCH/LEATHAM RELEASE PROGRAMME

The Branch/Leatham fishery is one of the region's key "stepping stone" fisheries and is central to the Fish & Game R3 programme. This now thriving rainbow fishery is a place for all anglers, regardless of skill level, and the amount of positive feedback we get from anglers is exceptional. This fishery offers a 'wilderness type' experience, but with very high success rates for anglers of all abilities. It has an excellent mix of drivable access points and 'backpack' options, and the fact that there are six DOC huts along the fishable area makes it a highly appealing destination for resident anglers.

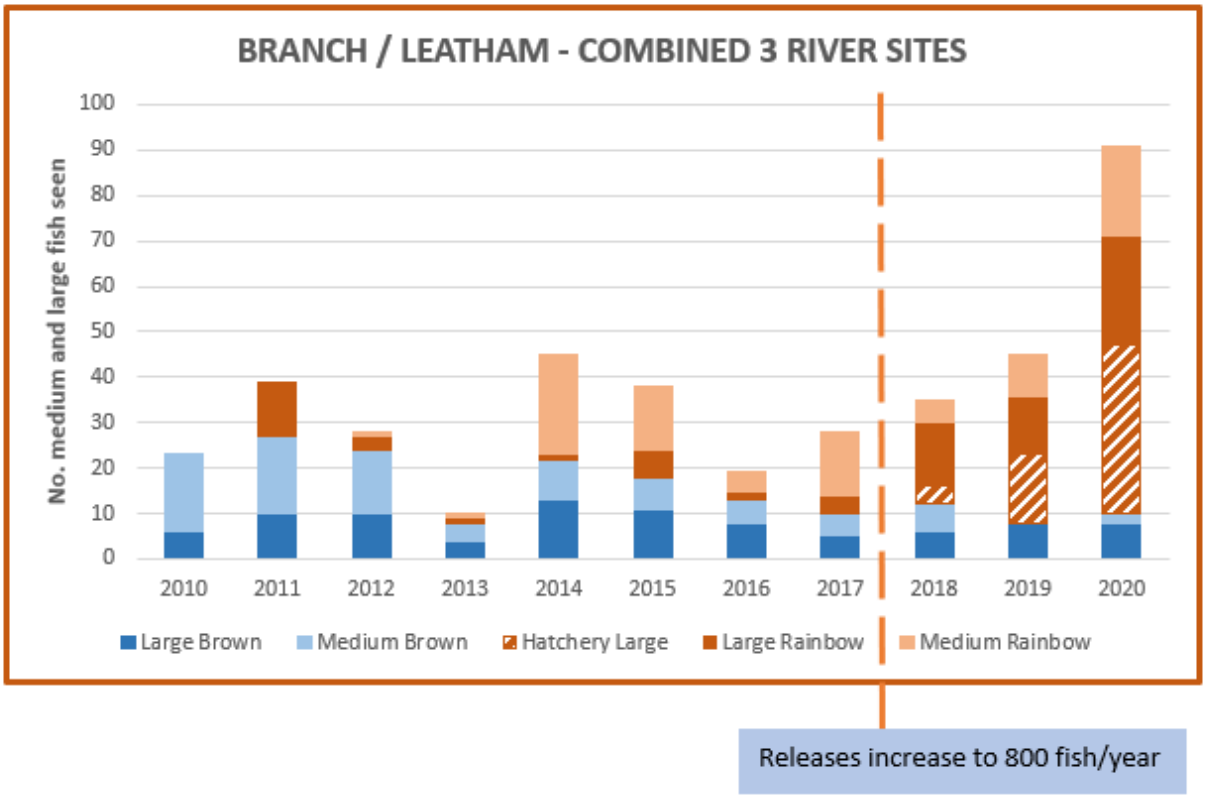
Typically, in recent years, 800 tagged rainbows have been released into the upper reaches of both rivers, though this year it was determined the population was more than sufficient in the upper sections, and a total of 468 fish were released (260 by helicopter, 120 into lower Leatham by vehicle, and 68 from hydro canal salvage).

This season, considerable effort was also spent on monitoring the resource in the Branch/Leatham, including native fish abundance, and compliance efforts were markedly increased in order to determine the level of non-resident use, as well as general angler satisfaction.

MONITORING

It can be seen by the graph of catchable (medium & large) fish below that just over 90 rainbow and brown trout were counted over three dive sites (approx. 3.5kms). Over half of the large rainbows were hatchery fish, and it is thought that the large December flood was one of the reasons the 2020 count was much higher than previous years, with some fish being pushed down to the lower part of the river.

Bearing in mind, that in the upper reaches, the observational data by staff and other anglers suggests there is a far higher fish density than what is seen in the drift dive sites due to proximity to release sites, and the fact that fish tend to hold better the higher up the catchment they are released. Note you can find more detailed monitoring data on page 23.



FISH CATCHABILITY ASSESSMENT

The Branch/Leatham catchment was visited on several occasions by staff for fish catchability purposes throughout the course of the 2019-20 season (noting the season concluded prematurely due to the covid-19 outbreak).

In total 482 fish were seen over the course of nearly 55 hours fishing (8.8 fish sighted per hour), though this of course would be actually higher accounting for un-sighted fish. On average, 2.78 fish were hooked per hour, with the success rate slightly higher overall in the Leatham (3.06 fish/hr) compared with the Branch (2.65 fish/hr).

This information certainly has to be taken with a measure of leniency and as a broad indication of fish catchability only, owing to the many variables in fishing e.g. fishing conditions, recent fishing pressure. For example, on one of the days fished, the same beat had been fished that day by a fishing guide (evidenced by tag returns/compliance data), and the fishing was, not surprisingly, tough.

Next year we will look to be more robust with our data collection by having the same angler fish the same site, in similar conditions, at least twice over the course of the season. We will accurately measure beat length to get a better idea of fish/km to complement our drift dive data, which is focused at the lower end of the fishery.

	Fish seen	Fish hooked	Fish landed	Hours fishing	Fish hooked/hr	Fish seen/hr
TOTAL LEATHAM RIVER	162	52	39	17	3.06	9.529412
TOTAL BRANCH RIVER	320	100	75	37.75	2.65	8.476821
GRAND TOTAL	482	152	114	54.75	2.78	8.803653

TOTAL BEFORE NEW YEAR (BRANCH + LEATHAM)

	Fish seen	Fish hooked	Fish landed	Hours fishing	Fish hooked/hr	
Leatham	105	45	34	13	3.46	
Branch	85	27	19	11	2.45	
TOTAL	190	72	53	24	3.00	FISH/HR BEFORE NEW YEAR

TOTAL AFTER NEW YEAR (BRANCH + LEATHAM)

Leatham	57	7	5	4	1.75	
Branch	235	73	56	26.75	2.73	
TOTAL	292	80	61	30.75	2.60	FISH/HR AFTER NEW YEAR

BRANCH TAGGING PROGRAMME

The Nelson Marlborough Fish and Game Council (F&G) on behalf of TrustPower have been restocking the Branch and Leatham River catchments with rainbow trout by heli – transfer since April 2018. The aim has been to achieve a minimum density of seven adult trout / km of river length to meet TrustPower's resource consent obligations. Prior to this, re-stocking occurred from 2010 via Ryders Consulting but at lesser frequency/numbers of fish.

From April 2018 to November 2019 F&G in total has transferred 1480 rainbow trout into the catchment by helicopter over four releases approximately six months apart. Each release has seen a batch or "cohort" of approximately 200 fish being put into each of the rivers (400 in total). Released fish are fin clipped and tagged with individually numbered floy or T bar tags.

The tags are coloured and individual fish within each cohort all have the same colour tag.

Different coloured tags have been used for each cohort. Generally only fish of the same single tag colour are put into each river e.g. the April 2018 release saw 200 green tagged fish transferred into the Leatham and 200 yellow tagged fish transferred into the Branch.

Over the course of the shortened 2019-20 fishing season, 222 tag returns were sent in from anglers fishing the Branch/Leatham catchment (at the time of writing). Just 22 of these were from fishing guides, though it must be said that this would in fact be much higher had fishing guides been more active in reporting tags, a somewhat dissappointing outcome. While the Branch/Leatham is generally favoured by guides for an 'easy' day's work, there was less pressure on the catchment this season owing to the trophy brown trout on offer elsewhere in the South Island.

There were many other fin clipped fish reported also, along with abundance of wild fish and brown trout. It must be said that there was a higher percentage of fin clipped (previously tagged) caught in the Upper Branch, which indicates there has been considerable removal of tags by anglers (possibly fishing guides cutting tags) – though there is also a natural loss of tags with a percentage of tags parting from the fish (spawning etc). In the past few years many of the fin clipped fish had accompanying tags, however this year the percentage of fin clipped with tags intact fish was far lower, noting we both fin clip and tag every fish released into this catchment.

So, over time there is a natural loss of fish from the catchment as evidenced by tag returns (and partly influenced by tag removal/loss), for example the reporting of green and yellow tags (from the first release) was far lower this year compared to previous seasons. A number of yellow tagged fish were seen on the drift dive below the confluence of the Branch and Leatham – the first time fish from this release (which took place into the Upper Branch), have been seen in drift dives.

Staff expected the huge December flood (in fact two large floods) to wreak havoc on the trout population, however as it turns out our fears were largely unfounded, with the highest drift dive count on record post flood, complemented by plenty of tag returns from resident anglers and frequent reports of good fishing. It can be said, however, that the flood did move fish around, with more fish from earlier releases into the headwaters (yellow & grey tags, for example), found lower down in the catchment, and fish condition suffered a little due to invertebrate impacts from the flooding.

One fish from the November release was caught in the Wairau below Renwick, and a few made their way into Lake Argyle which is fairly normal (most likely a result of the subsequent low flows experienced).

^ *Branch/Leatham confluence - before and after the December flood*

BRANCH TAGGING PROGRAMME FINDINGS

After several years of tag returns from local anglers the programme has yielded some interesting data:

- It generally takes around one month from the release date for anglers to locate and regularly catch the released fish
- 378 tag returns have been received from the 1480 released fish. This equates to a 25% return rate which is outstanding, but likely to be significantly under reported, given lack of returns from guides.
- 83% of tag returns come within the first 12 months of release and 17% in the second 12 months after release. This indicates a gradual decline over time with only a residual number of returns being received after 18 months. This decline in tags returns over time is likely a result of out-migration, harvest, and tag loss / removal.
- Factoring in angler reporting of approximately 250 additional fin clipped fish this percentage of reported fish is around 43%
- Similar numbers of returns have been received from within each catchment but the return rate is markedly different between the two catchments (Leatham = 36%. Branch = 16%).
- There is very little mixing of fish between the two catchments.
- Tagged fish from Branch/Leatham releases are often caught in Lake Argyle and the Wairau River

PRO'S OF TAGGING

- The success of each release can be measured/monitored. To date all of the F&G releases have been extremely successful in comparison to prior releases undertaken by Ryder Consulting on behalf of Trustpower.
- Further confirms that the Branch Weir is a fish barrier and that the fish ladder doesn't work.
- Can give an indication of natural recruitment within each river.
- Useful to determine residency time and required restocking rate / frequency.
- If there is ever a disease or other problem with released fish it can be traced back to one or more cohorts.
- Positive feedback from anglers who enjoy catching tagged fish and see it as value for their licence fee.
- Positive engagement between F&G staff, rangers and anglers.
- Good PR opportunities for F&G and Trustpower.
- Opportunities for R3 promotions.
- Generates useful data by itself which generally reflects angler feedback and even better data when combined with drift diving.
- We are less reliant on just drift diving for monitoring.
- Minimal cost especially when compared to angler satisfaction.
- Satisfaction for F&G staff and Councillors to know / demonstrate that the fishery has finally been fixed and maintained following hydro weir development.
- Wouldn't have the earlier / above outlined tag return findings without it.
- Can make fish easier for anglers to spot.

CON'S OF TAGGING

- Guides and some anglers appear to dislike it.
- More cost / time.
- More handling / stress to fish, but they seem to tolerate it OK.
- Damage / infection to some fish from tag entry and rubbing – mostly superficial.
- Might not tell us a lot more than we now know i.e. what questions do we still want to answer?

JUVENILE TROUT RECRUITMENT

While it would be fair to say last years' young of the year were largely wiped out by the December flood, staff were delighted with the survivability of young stock from the year prior to that, in effect, 18 month old rainbow trout. Staff fielded frequent reports of these feisty young fish getting caught inadvertently by anglers while fishing for their larger counterparts. Decent numbers were also seen in drift dive counts.

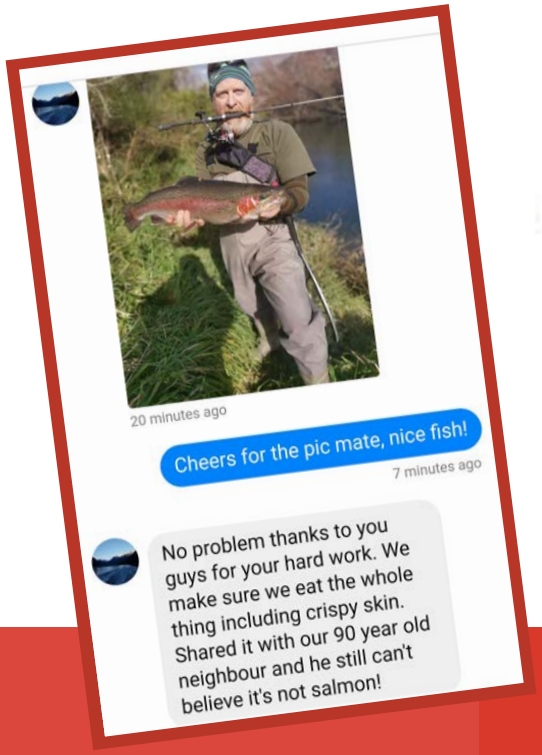
While many of these fish will remain in the Branch/Leatham Rivers, some will find their way into Lake Argyle by way of the hydro intake, as well as into the Wairau. In March, around 100 small rainbows were seen in the settling basins, and many of these will end up supplementing the lake population, where they will be appreciated by anglers as wild fish.

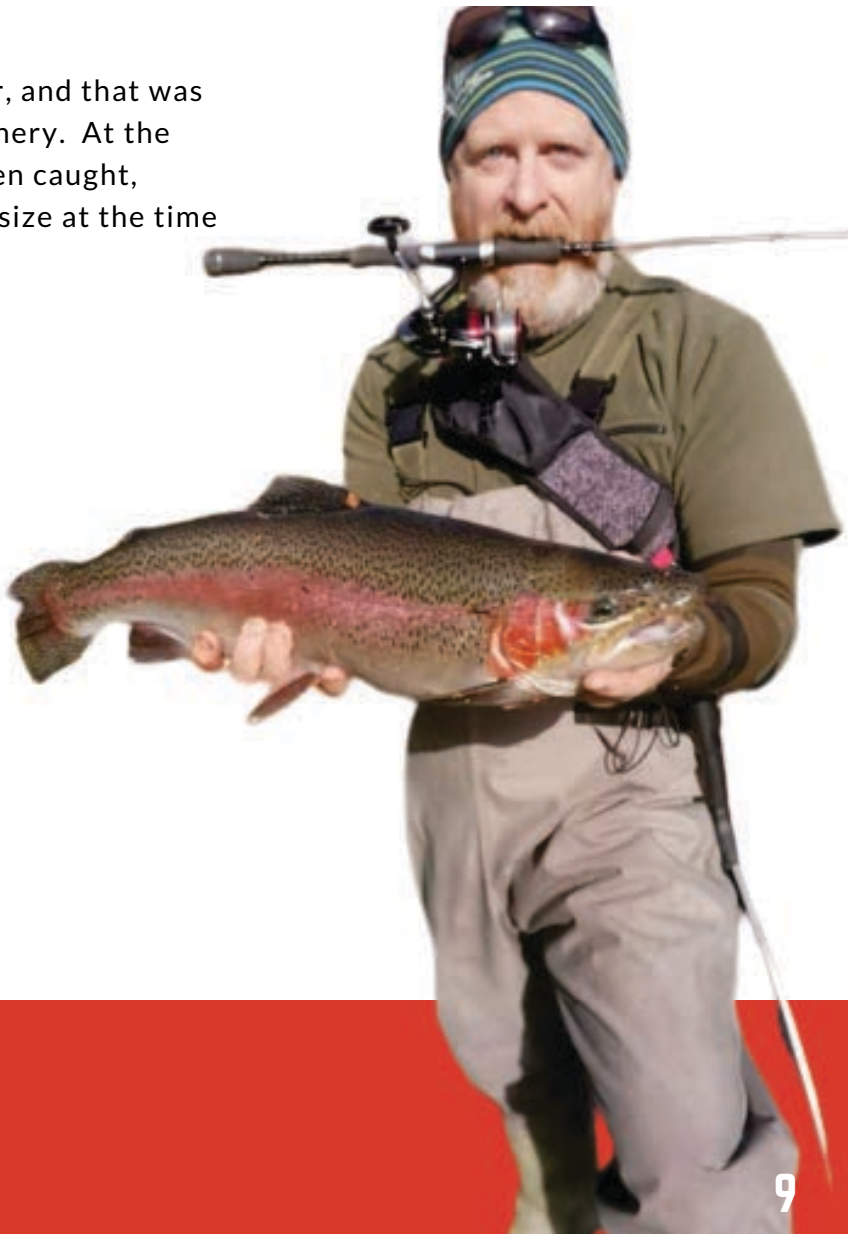
RECOMMENDATION

Based on compliance data, drift dive counts, and fish catchability results staff recommend that the Branch/Leatham should not be designated as a backcountry fishery, and that the May season extension continue. We also recommend that our significant compliance efforts here continue for the 2020-21 season, which allows us to get a good idea of angler satisfaction and non-resident anglers use.

RAI RIVER RELEASES

Only one release took place in the Rai this year, and that was during April in order to promote the winter fishery. At the time of writing a number of tagged fish had been caught, providing good sport to anglers owing to their size at the time of release (3kg average).





FEEDBACK FROM RELEASES / R3 INITIATIVES

Jimmy Campbell
Finally got me one too! Great morning fishing today, nice and clear😁

Heather Baigent
Thanks for such a great day, even if the fish played hard to get. Plenty more there for another time, thanks to the hatchery for providing awesome fish and everyone involved in setting this day up.
Like · Reply · Message · 24w 1

Paul Stretch
Good work a great asset to your region, great family fishing location
Like · Reply · Message · 24w 1

Nelson Marlborough Fish & Game
September 10, 2019 ·

FREE STARTER PACKS
If you're a new Nelson Marlborough licence holder, let us know and we will send you out a starter pack including a magazine, a selection of lures/softbaits that will catch you fish, and some great info!
If you haven't fished for a few years and are thinking of getting back into fishing - get yourself a licence and we'll also send you out a pack.
All you have to do is add a comment below, or email nelsonmarlborough@fishandgame.org.nz - and if you qualify - we'll pop a starter pack in the post.
Thanks to Hunting & Fishing Nelson, Terry Duke for tying some flies & Henderson's staff

2,172 People Reached 299 Engagements Boost Post

I wanted to pass on my sincere gratitude for providing the fishing opportunities that exist at Lake Argyle (and Appelby Ponds for that matter) that allows a 'soft' entry into trout fishing for my sons. I am extremely grateful, and just love it when it all comes together and they catch a good fish. Opportunities like this are not that common in today's society, so I just wanted to say an immense thank you to you all and to keep up the great work. Competition prizes aside, my prize is to see my sons get the fishing/hunting bug like I've had all my life, and this resource is certainly helping that to happen.

Trevor Irwin
No problem at all. Thanks for asking. And thanks for the good work you do. My boys are suddenly big time into trout fishing.

Colin Jefford
Well done F&G, good to see some of our lisence money going back into an excellent and easy asessable fishery.
Like · Reply · Message · 7w 2

Aaron Keppel ▶ ☆☆Fishing Marlborough☆☆
4 mins ·

Taking my son fishing tomorrow at Lake Argyle, any tips on spinning lure? He has never caught a fish so he is all set for a big day out with Dad. male bonding at it's best.

Tahana Cootes
Nice 1 team... i was starting to feel bad catchn them and not seing others catching... awesome work. Young boy got 1 of the giants at the carpark. 10plus lb... 6yr old.. hes hooked for life now...
1 h Like Rep

Hannah Gillespie
Was such a great event, thank you fish and game!
Like · Reply · Message · 24w 1

Derek Bowman
Wow cant wait till all the kids are back at school t
leisurely fishing trip mid week.
Like · Reply · Message · 24w

Bridget Fitzgerald
Thanks so much this was a really great day!
Like · Reply · Message · 24w 1

A great morning up at the pond....very cold though. Had alot of laughs with Andy & Ratu from Mokinui and there were some great fish caught and released. Peter Campbell caught a cracker!. A stray bottle of Glenfiddich provided the necessary warmth.

POPULATION MONITORING

Nelson Marlborough Fish & Game aim to drift dive at least 20 rivers per year. This year the target was met with 20 dives achieved, made up of 18 rivers from this region as well as two others for West Coast Fish & Game. Staff had wished to dive the Wangapeka River also, however the outbreak of covid-19 meant all fieldwork ceased, and this dive was unable to be completed. 29 sites were dived within the 18 Nelson Marlborough rivers.

In the following pages you will see results from drift dive counts, electric fishing surveys and winter spawning counts for a number of catchments within the Nelson Marlborough region.

PELORUS CATCHMENT

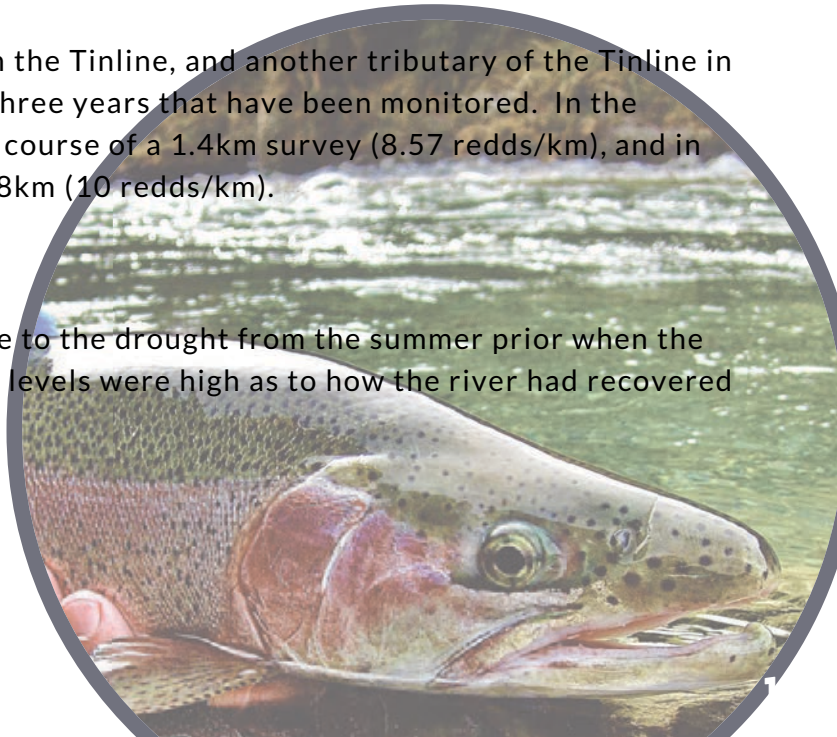
Within the Pelorus catchment, drift dives were undertaken for the Tinline, Opouri, Rai and Pelorus rivers. Winter spawning surveys were completed for the Rai, Opouri and Tinline, and an electric fishing survey was carried out in the Opouri for annual native fish monitoring, the results of which can be seen on page 35.

TINLINE RIVER

The first dive of the season was the Tinline in early November. This river, while appearing to have great habitat, continues to yield very low trout numbers, and it is the opinion of staff that the system, similar to other rivers out of similar geology such as the Lee, has very low productivity and therefore can sustain few trout.

Only one small rainbow and one small brown were seen on the 2019 dive, down on previous years where at least some large brown trout were in residence. The Tinline appears to be a moderately important spawning system, however, and future monitoring efforts should be focused on winter spawning assessments here, rather than drift dives – particularly to identify rainbow trout spawning activity (in the 2018 survey zero activity was detected). Previous experimental releases have clearly not had much positive effect on this river, for this would have been seen through annual drift dives by now.

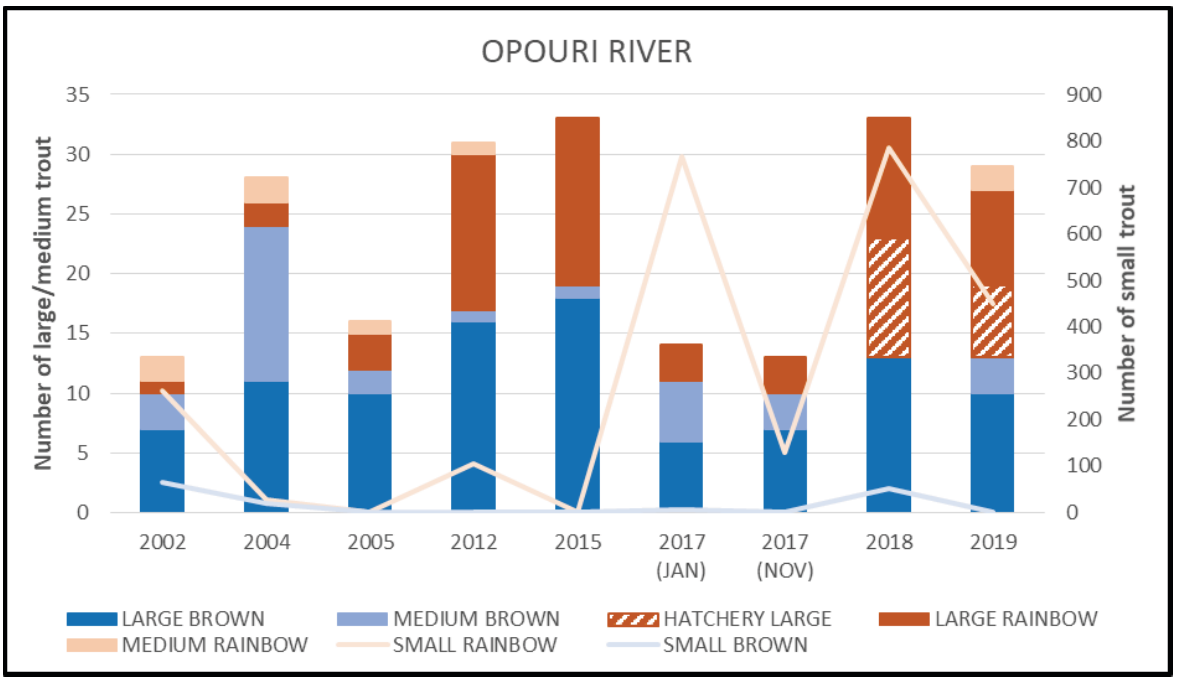
A winter spawning foot count was completed in the Tinline, and another tributary of the Tinline in late June and yielded the highest count in the three years that have been monitored. In the mainstem Tinline, 12 redds were seen over the course of a 1.4km survey (8.57 redds/km), and in the Tinline tributary 8 redds were seen over 0.8km (10 redds/km).



OPOURI RIVER

The Opouri was dived on November 26, and due to the drought from the summer prior when the Opouri dried up for much of its length, interest levels were high as to how the river had recovered from this event.

Clearly, trout have quickly recolonised this reach which went dry for its entire length, and where fatalities were reasonably high. 14 large rainbows and 10 large browns were seen, roughly a third less than the year prior before the drought. A reduction of young of the year rainbows was also seen, though this is a fairly normal fluctuation and there were still reasonable numbers in residence, indicating some spawning had taken place within the reach (this was witnessed the year before with a number of redds seen at the tail of various pools within this reach). Of the 14 large rainbows, 6 of these were tagged fish from previous releases. The tagged fish looked in good condition, similar to the wild rainbows.



The Opouri once again dried up in the early part of 2020, however there appeared to be more residual pools compared to the 2019 drought, and therefore lower fish mortality expected.

Staff visited the Opouri in mid-February and noted that trout (large and small) appeared to be surviving in pools, and there was little evidence of mortality and stressed fish. For the most part, cruising trout could be seen still feeding.

OPOURI RIVER SPAWING ASSESSMENT

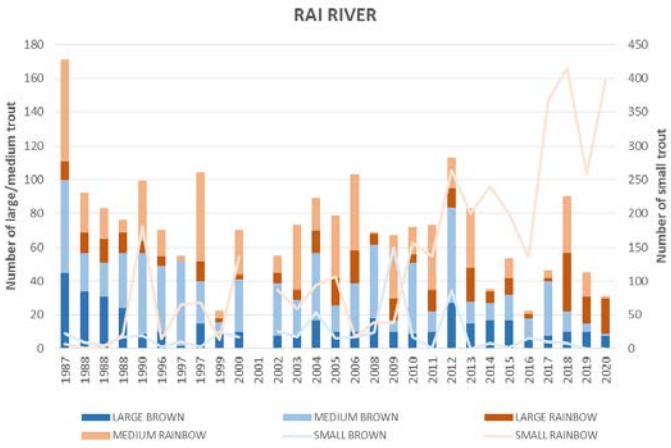
The Opouri was also walked from the Ronga confluence upstream for 1.6 km on August 1, however no redds were observed within this site, which is also part of the drift dive site. The rainbows may well be spawning later, so this was perhaps a little early.

Decent numbers of young of the year fish were seen on the subsequent drift dive indicating some rainbow spawning had taken place, likely within this reach as was the case the year before when redds were observed while electric fishing in October.

It is staff opinion that fish that have been released into the Rai/Opouri are more likely to spawn within the mainstem, rather than migrate upstream to headwater tributaries to spawn, with the wild rainbows population, based on overseas studies in this area.

RAI RIVER

The Rai dive was completed in late January, using five divers. Numbers of large brown and rainbow trout remain fairly solid, however there was a distinct lack of fish in the medium sized cohort, a pattern mirrored in the Motueka/Wairau dives. Note: the meteoric rise of small rainbows in the Rai, Opouri and Pelorus was due to combining young of the year and <18 month old trout in one group from about 2015 onwards. This is mostly the case with rivers that hold both brown and rainbow trout. For the most part, small trout identified in all other rivers are 1+ year old. Of the 21 large rainbows seen, five were tagged or fin clipped.



RAI SPAWING ASSESSMENT

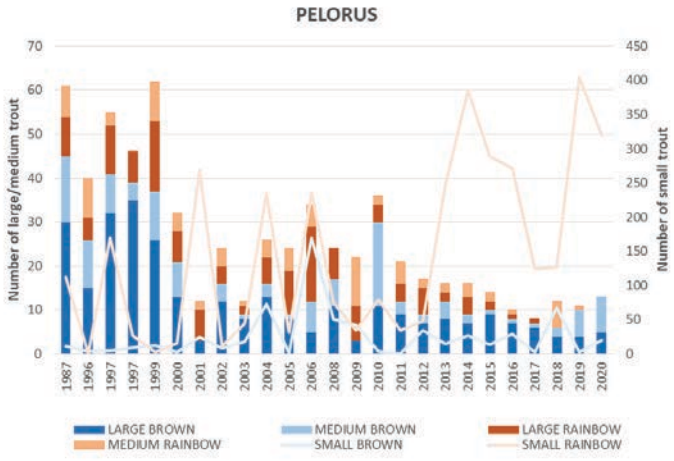
An assessment of the Rai from Bulford bridge was undertaken on August 1st after we received a report from an angler, who's son had captured a released rainbow at this location which had just spawned. Finding only one redd and observing no adult rainbows over 2km was reassuring, in terms of potential impact of the winter fishery designation on rainbows.

It appears at this time of year most wild fish are in the headwaters somewhere spawning, perhaps in the Tunakino catchment. It's quite likely the one redd observed just below Bulford bridge, was from a released fish, given the angler reports.

Rai River redd below Bulford Bridge >>

PELORUS RIVER

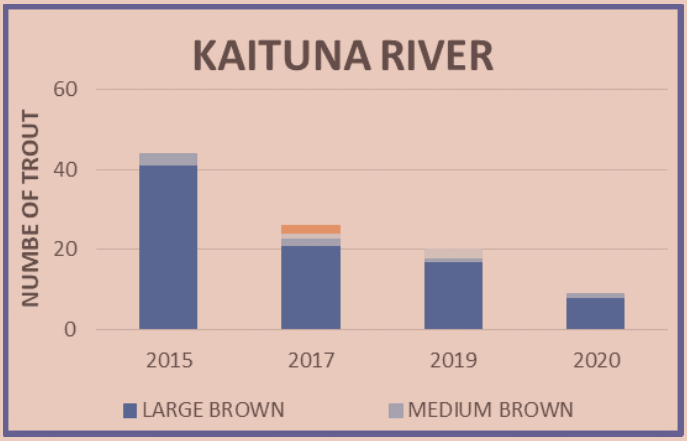
This was the first time that medium sized rainbows were not observed on this drift dive site, which runs for approximately 2kms upstream of the Pelorus Bridge. The water was extremely warm therefore fish may have dropped down to below the Rai, to seek thermal refuge there or in deep pools with groundwater inputs. Owing to low flows/warm temperature there was a higher than normal abundance of filamentous algae. It is possible that staff may decide to rest this site and concentrate on a site further downstream. There is a historic site at Hughes Creek further downstream, which would provide better information in staff opinion, and where there is likely to be greater numbers of fish. Staff feel we are not learning much useful information from the current dive site, and it has been a case of simply 'going through the motions'.



KAITUNA RIVER

The Kaituna was dived in early March – the final dive of the season. It can be said that Kaituna has steadily declined since the volatile flood the catchment experienced in 2016. Just 8 large and one medium brown trout were seen throughout the length of the dive, which in 2015 held 41 large fish.

The presence of a seal in the Kaituna River recently is another reason the river may be in decline. Being a small river, seals can have a huge effect on the trout population, as was the case with Spring Creek also.

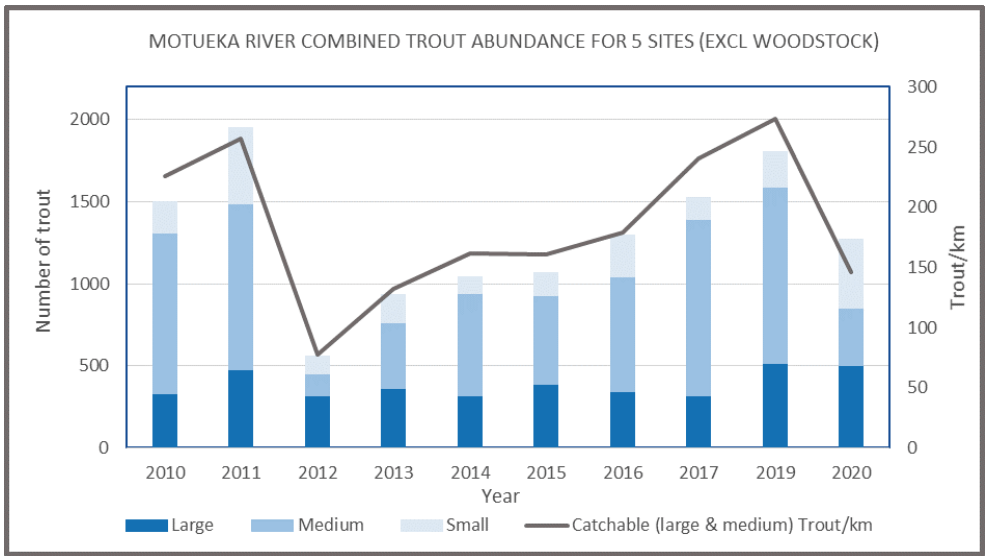


MOTUEKA CATCHMENT

Drift dive surveys were carried out on the Motueka, Motupiko and Upper Motueka. In winter the Stanleybrook, Tadmor, Motupiko and Pokororo Rivers were visited for spawning counts.

MOTUEKA RIVER

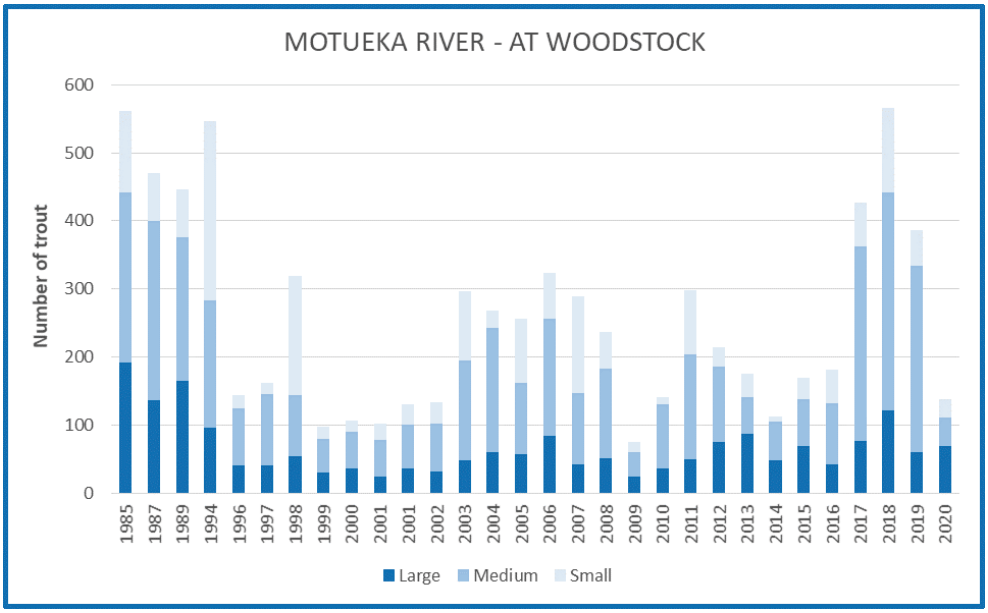
The Motueka was dived on 10 February, covering five historical sites and using 8 divers. The Motueka has been the subject of some extreme conditions with droughts two years in a row, and decent Spring flood events, and has well and truly come off its lofty perch of last year which saw the highest trout population since the early 1990's. The dive results revealed the population across the five monitoring sites (5.8 km total) go from 274 large/medium fish per km in 2019 to 146 large/medium fish per km this year. Notably, the medium sized fish were well down with over 700 fewer medium sized fish compared to last year.



THE IMPACT OF LOW FLOWS?

The Woodstock site has been dived annually since 1989 and forms a robust dataset on annual fishery cycles. In 2015/16 the region experienced two relatively stable spring periods during the critical fry emergence phase from Sep - Dec.

What followed was a significant pulse of juvenile fish moving into the fishery with a substantial increase in medium fish coming through, observed in 2019 as shown on the Woodstock site graph. This phenomenon (stable spring flows) has been documented as one key driver of the Motueka fishery biomass by the Cawthron Institute after previous analysis of Fish & Games long term drift dive dataset for this river.



By the time the river was dived in 2020 however, most of this large pulse of medium fish had vanished from the system. Interestingly this correlates with additional fisheries modelling work undertaken by the Cawthron Institute within the Motueka, which revealed that medium (but not large) fish, are significantly impacted by summer low flow events. This result was unexpected by researchers and it was postulated that the shoaling nature of medium fish within the wider/shallower runs rather than deeper premium holding water, made them more vulnerable to low flow/high water temperature and predation impacts. In addition, mediums may be more susceptible to heat stress as they only have half the body size to absorb heat and big fish may also potentially be actively keeping them out of preferred thermal refuge lies. The impact of summer low flows on medium fish is highlighted in the 2020 dive result in the graph shown for the Woodstock dive site, which shows large fish numbers to have not lowered at all for the last two years, but a loss of around 250 medium fish had occurred. This pattern was generally reflected through all five monitoring sites.

Given the requirement for stable spring periods, followed by no major summer droughts to really get the fishery humming, it is little wonder that the Motueka fishery only really peaks once every decade or two, in terms of fish numbers. The silver lining, however, is that there are always still plenty of trout in the river to keep anglers happy, and with a lower overall number of fish, the average size increases significantly, so those skilled enough to still catch wily large adults within this fishery, can still experience some great fishing.

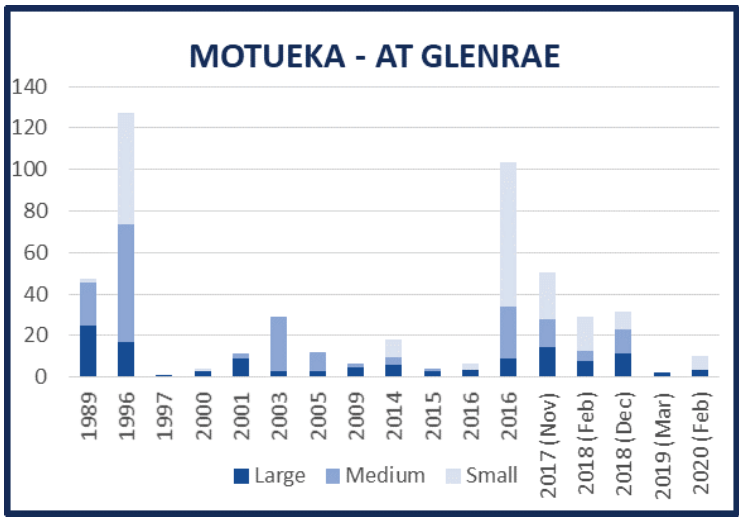
<< Medium fish took a hit in the Motueka

v> Despite the loss of mediums, the Motueka always has plenty of fish and good fishing on offer

UPPER MOTUEKA RIVER

The Upper Motueka was dived on 12 February, with the flow at 1897 litres/second. Just 4 large and 6 smalls were observed, with 4 of the smalls being young of the year.

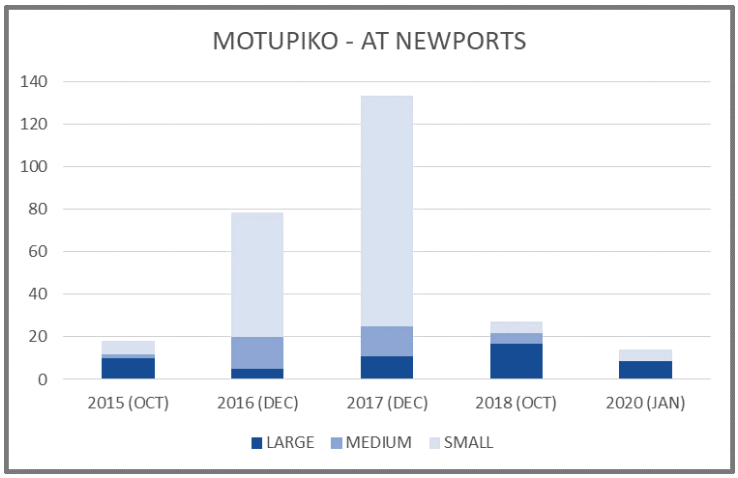
This was a similar result to the previous year when just two larges were seen. Of course, with the low, warms flows, most fish in this stretch of the Motueka from the Wangapeka confluence to Kohatu had bailed out for the cooler waters of the Wangapeka as evidenced by previous monitoring results. Unfortunately, the Wangapeka was not dived due to time constraints, however had this been completed, there would have been little doubt the lower Wangapeka dive site would have held high numbers of fish.

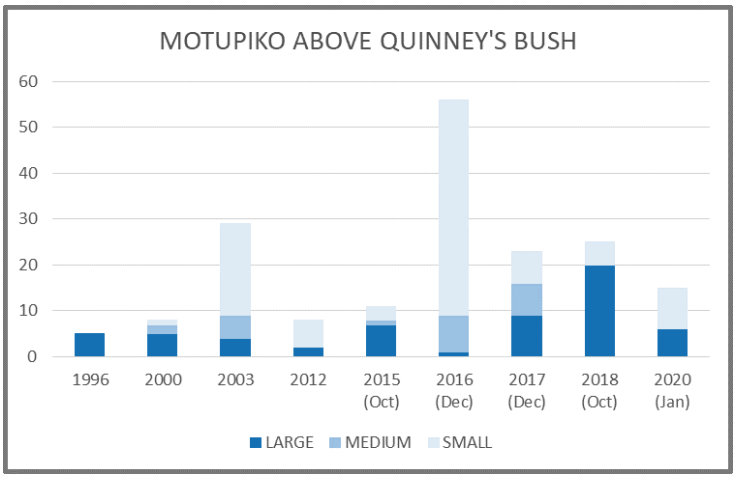


MOTUPIKO RIVER

The Motupiko has now been dived 5 years consecutively. For the recent January dive, low numbers of juvenile trout were seen which is contrary to both other December dives when higher number of juveniles were present in the system, compared to both October dives. The likely reason for this is the large December flood event which would have either displaced the young fish downstream, or was potentially fatal for many of them.

Large fish abundance was down on the previous year – a year when most fisheries flourished, however still fairly normal compared to other years. There was an absence of medium sized fish at both dive sites, again a consistent pattern seen in most fisheries monitored. Also notable are the high numbers of juveniles present in 2016 and 2017. This cohort of fish was the result of two very stable years which subsequently led to the high numbers of fish in the Motueka over the 2017-18 & 2018-19 season.

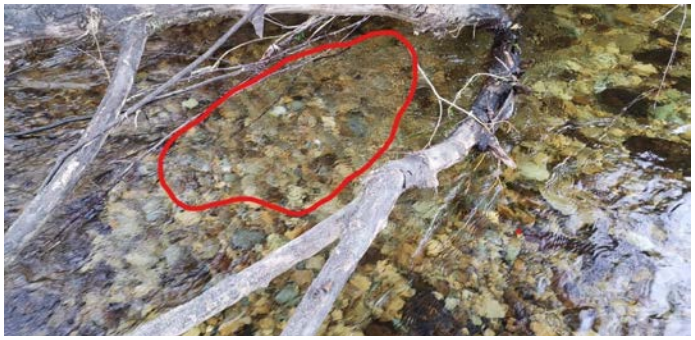




MOTUEKA CATCHMENT SPAWNING SURVEYS

MOTUPIKO

The Motupiko was surveyed in winter 2019 for approximately 5km finishing at Korere Bridge. The work was undertaken in response to a request from Taylors contracting/TDC, relating to undertaking winter river repair works within this potential spawning stream. The survey revealed 4 definite redds over 5 km (0.8/km), but also several pods of between 12-15 fish preparing for spawning. The present approach to river works within this system, is leading to pool (and thus adult trout habitat) re-creation, which is supported by Fish & Game. However, given the location of 4 definite redds (although low density c.f. headwater spawning sites), and a large number of pre-spawning fish, TDC/Taylors agreed to defer two of the instream work sites which were likely to generate significant sediment mobilisation, until September, at which time fry emergence from existing Redds should have occurred.



TADMOR

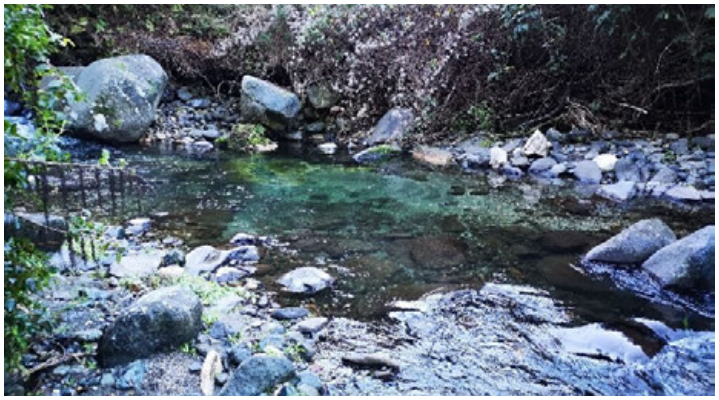
The Tadmor was surveyed June 17th 2019, below Tui Rd Bridge for 1.3km. A total of 5 definite redds were counted, similar to the count two years earlier. Good gravels exist for spawning within this systems, however juvenile rearing habitat in the upper river is constrained somewhat by a large degree of fine sand infilling sediment from natural bluff erosion. It is possible that juvenules move downstream for rearing where substrate is larger, post spawning.

STANLEYBROOK

The Stanleybrook was surveyed on 28 June 2019, with the stream at normal to low winter level. A total of 7 definite redds, and 3 possible redds, were counted from the confluence to the main road bridge – a higher count than normal. Spawning gravel quantity and quality was excellent, and with the Motueka in a population peak, the result is not surprising. A further 300-400m of the Stanleybrook was surveyed above the bridge and, despite excellent quantity of available gravels, no redds/fish were seen.

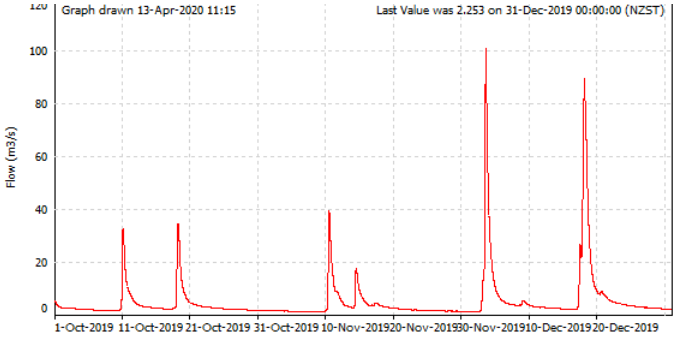
POKORORO

The Pokororo was surveyed on 28 June 2019 in normal clear winter flows. The upper section was surveyed from the first bridge that crosses the Pokororo up to above the 2nd ford where the survey was abandoned. Available gravels were very limited due to the steep, boulder nature of the river and zero redds were seen. However a pair of fish clearly in spawning mode were seen not far above the start point – see picture. A further ~1km of river was surveyed above the Westbank Rd bridge, and despite better availability of gravels, no redds were seen, just one large resident fish in a pool.



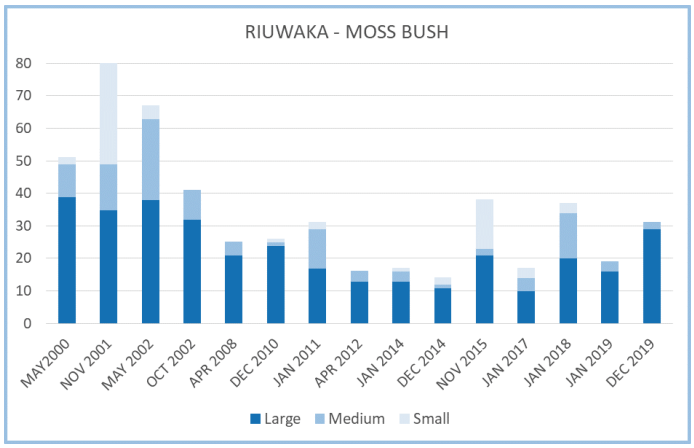
RIUWAKA RIVER

The Riuwaka River was dived on December 12, after a significant flood event in early December which saw the Riuwaka reach annual flood level of just over 100cu at Hickmotts. Winter spawning surveys were carried out in June, and annual electric fishing surveys completed also.

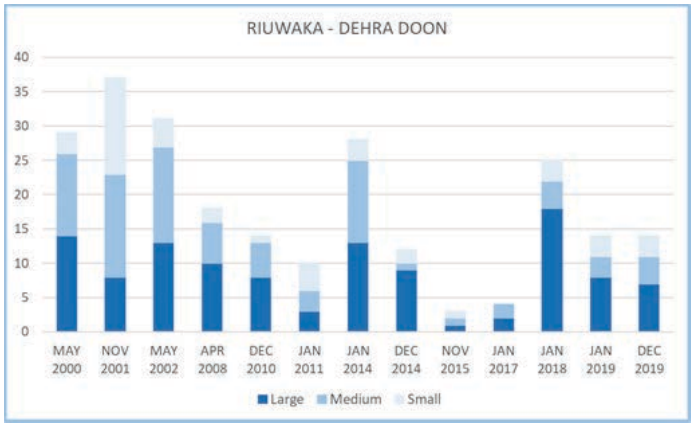


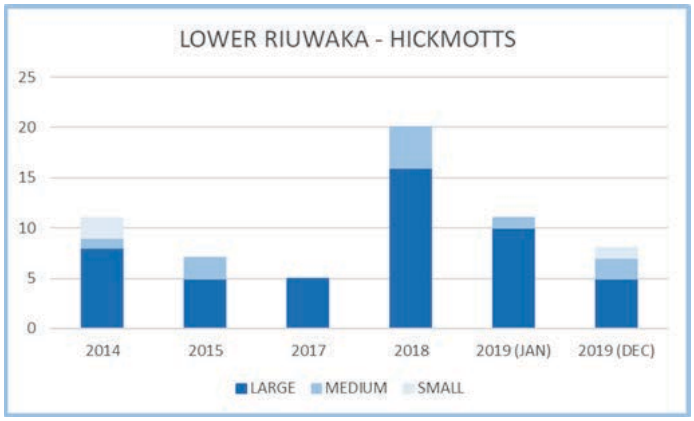
On entering the water at the upper Moss Bush site, it was apparent that this flood had done some significant damage to the riverbed – more so than Cyclone Gita which caused unprecedented damage to the lower half of the river, which the Moss Bush site was far less affected by.

Considerable erosion and channel modification had occurred. Not surprisingly, small fish abundance for this dive site was nil, and many of the large fish in residence were showing the effects of the flood event and were deemed to be in poor condition.



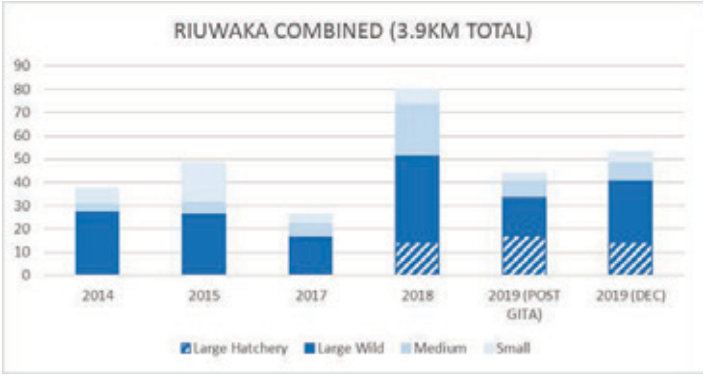
The lower two sites, above and below State Highway 60 were fairly typical for these reaches in regards to trout numbers, though these dives will be remembered more for inanga observations. In the lower reach the only shoals of inanga that were seen were taking refuge under wilding willow trees, which have managed to escape the TDC spraying regime. Fish & Game staff have been stating this for some time, that trout, and indeed native taonga, need shelter in the form of overhanging branches – something that is sorely lacking in the stretch of water below SH60. The best thing that TDC can do in this case, is simply, nothing, and allow wilding willows to grow to provide fish habitat. Weeping willows that Fish & Game planted some years ago are growing well however are some distance from the waters edge with little in the way of overhang.





Fish & Game would do well to undertake annual maintenance of willow trees at this site (likely less than a day's work), and top any willow trees before they become an issue and take up too much of the flood channel capacity, which is a concern for TDC engineers. Topped willow trees will grow out across the water rather than skyward and provide trout and native fish with good habitat. TDC have still yet to strategically place 'fish structure' in the form of large boulders within the channel to provide depth and hydraulic diversity, something which fish need, rather than the homogenous channel which is currently in place, and which is why fish numbers remain low in this reach.

With regards to hatchery fish that were released in 2017, their presence in the system remains consistent after the initial loss of fish soon after release. Of the 41 large fish seen across the three dive sites, 14 of these fish were hatchery fish – very similar to the previous year.



^ *Combined trout count for all three Riuwaka sites.*

SPAWNING SURVEYS

The Riuwaka North & South Branch was surveyed on 20 June 2019 in normal clear winter conditions.

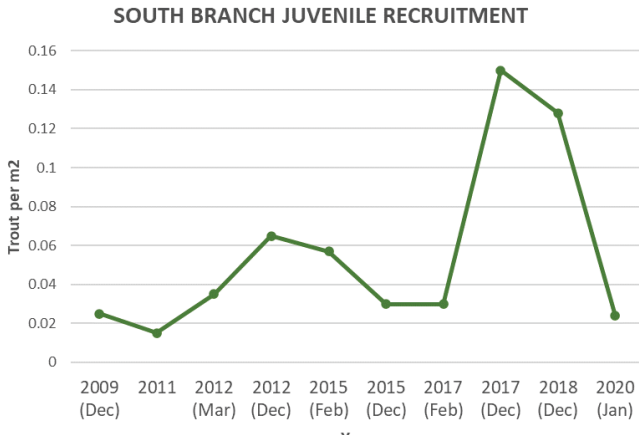
The North Branch was surveyed from Jenny Ryder's Bridge to the carpark (1.4kms). A total of 2 definite redds and 3 possible redds were seen – all around/above the rock wall protecting the road where there is the greatest abundance of gravels. Two fish were seen holding on one of the redds. On the way to the South Branch a pair of fish holding on a redd was seen below the confluence bridge.

The South Branch had a good amount of spawning activity in 2018, so hopes were high for a decent result this year. However for this 1.2km reach just 2 definite redds were observed, though there were 6 possible redds. Five adult fish were seen, though these did not appear to be in spawning mode and were actively feeding.

The site was revisited two weeks later on 6 July and little had changed. The river was higher after a recent fresh, and the gravels had been scrubbed clean so this made for difficult identifying of redds.

ELECTRIC FISHING SURVEYS

The Riuwaka River has been the subject of some significant monitoring efforts in the past decade, with annual electric fishing surveys in the North & South Branch to monitor juvenile trout numbers/native fish. Juvenile trout recruitment has been an ongoing issue for the Riuwaka (where most of the spawning occurs in the mainstem of the North & South Branches) meaning fish are vulnerable to rapid flood events, which are a feature of this river in a steep catchment.



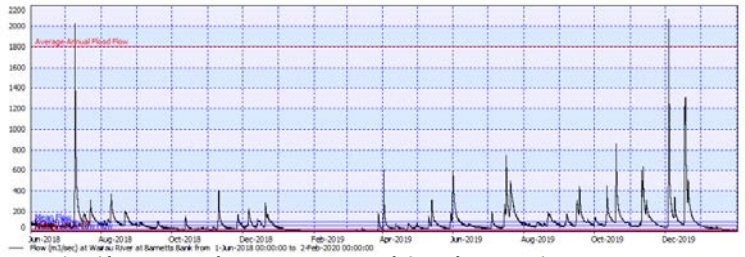
The juvenile trout population at the South Branch Ford (along with native fish), was still low, with only 6 fish counted (246m2). Just two trout were counted at the South branch woolshed site (80m2), and five at the North Branch site (80m2). Zero koaro were seen also across all three sites - see more information in Native Fish chapter.

WAIRAU CATCHMENT

The Wairau catchment was well surveyed this year with drift dives undertaken in Wairau (upper, middle & lower), Branch/Leatham, Goulter, Taylor and Spring Creek. Extensive electric fishing surveys (predominantly for native fish but including trout), were completed in the Branch/Leatham which are detailed in the Native Fish chapter.

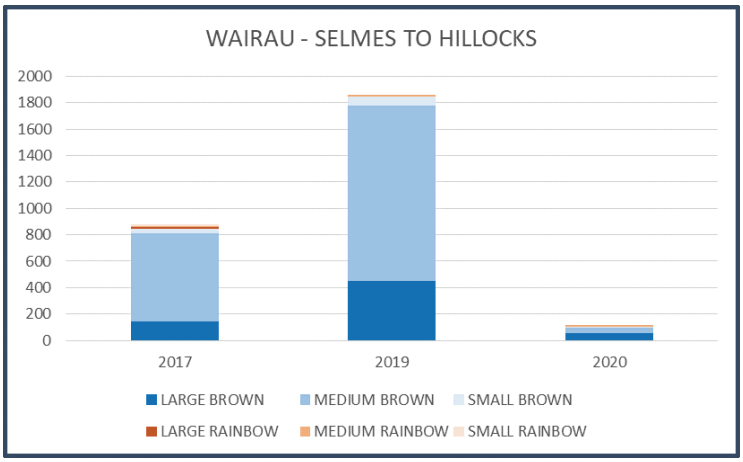
WAIRAU RIVER

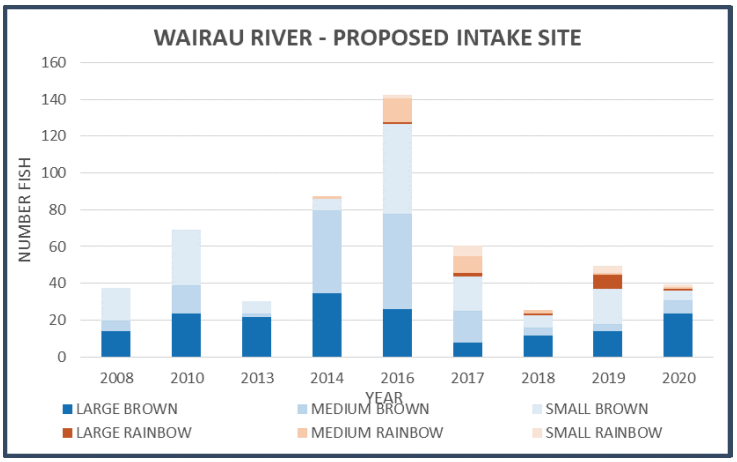
Four dive sites were completed in the mainstem Wairau, one above the Branch confluence, and one in the lower river at Selmes Road – both on 21 January, and two sites within the upper Wairau on 13 February. Fishing reports from the Wairau indicated challenging fishing, and it was deemed this season was fairly poor compared to previous years.The river experienced a significant flood in December (the same one that impacted the Branch catchment), however the loss of fish that can be seen in the below graphs are likely caused from two summer periods with very low flows, similar to what occurred in the main-stem Motueka.



The most radically changed reach was the lower site at Selmes Road, with a massive reduction in fish from 1779 large/medium brown trout in 2019 down to just 99 large/medium fish in 2020. Granted, the summer of 2019 saw the region in a drought, and a low flow of just 6 cumecs (at the time of dive) had concentrated trout into deep holes and cold-water inputs in the lower part of the Wairau. While the flows at the time of the drift dive were far higher (~21 cumecs), fish numbers were far lower than they should have been with possible explanations either being the December flood which went over 2000 cumecs, or the cumulative effects of the low flows the summer before (Young *et al*. 2012). To add weight to the argument that low flows had been the telling factor, the Wairau experienced a flood of similar magnitude in July 2018, and trout numbers were still very high a number of months after this event. Cyclone Winston, which occurred in January 2016, reached around 2250 cumecs, and the trout population fared well considering (likely due to the amount of lateral give in the riverbed where trout can safely endure the flood event). Note this site has been used in favour of the more historical Rock Ferry site.

Upstream at the proposed intake site (above Branch confluence) 24 large, 7 medium and 5 small brown trout were seen, which could be considered a fairly normal count for this site.





Rainbow trout abundance remains fairly low, with just one large and two medium fish seen.

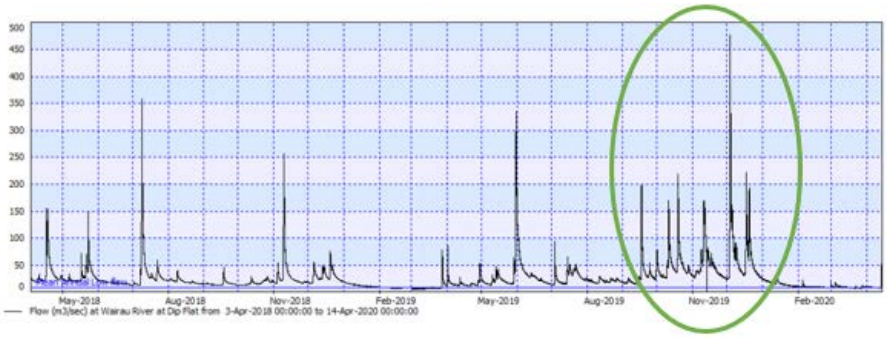
Two adult salmon were seen on this dive.

Rainbows were scarce, with just one large and one medium counted.

62 smolt and zero adult fish seen.

UPPER WAIRAU RIVER

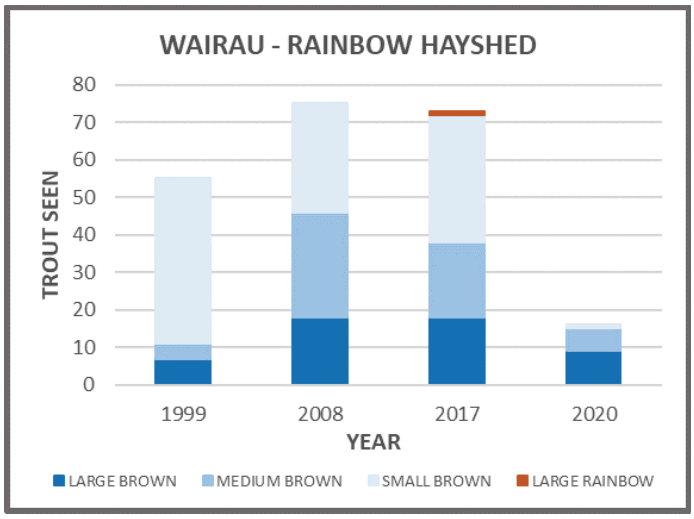
In the upper Wairau, significant flood events over the course of the past two years had clearly done some considerable damage to the riverbed, and subsequently the trout population. Floods over Spring and Summer washed out the road at Conner's Bluff, causing Rainbow Station to create a detour around the bluff. Though this year was a mouse year, this river received less pressure than expected, no doubt due to low numbers of fish present in the system as well as the season prior, and the bounty of huge fish on offer further south. Staff heard of some double-digit fish taken, but nothing like the boom summer of 2015. A number of days were spent in the upper Wairau on compliance duties and fishing pressure was very light.



> The Upper Wairau saw multiple floods over Spring.

WAIRAU - RAINBOW HAYSHED

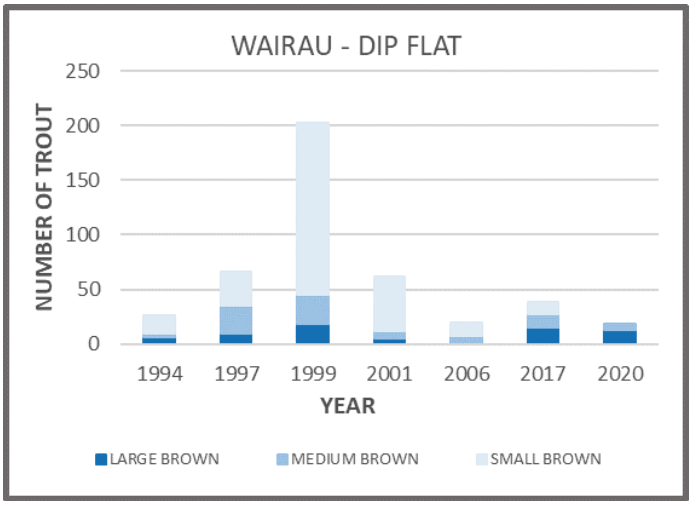
The site downstream of the Rainbow confluence was clearly affected by flood events, with the brown trout count just 9 large, 6 medium, and 1 small. No rainbows were seen on the dive, although staff fielded a report of a 5lb rainbow caught by a fishing guide in the Upper Wairau. Numbers of small brown trout took a substantial hit, with the count from the three previous dives being 44, 29 and 34 fish.



2 adult salmon, 355 smolt seen

WAIRAU - DIP FLAT

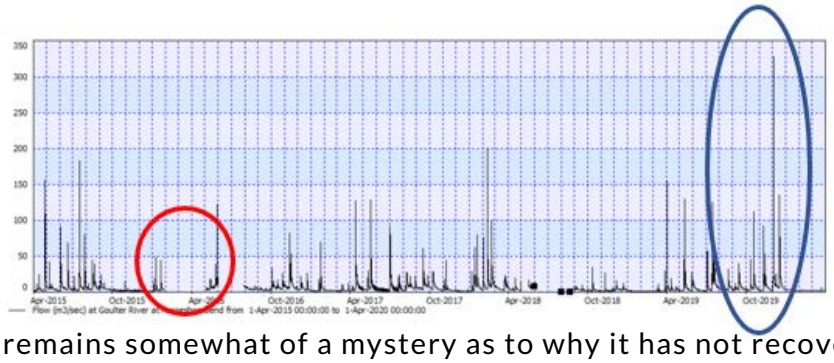
At Dip Flat numbers were similarly down with zero small fish and 6 medium browns, though numbers of large browns were fairly normal at 13 fish, including one double digit trophy seen by divers.



2 adult salmon, 12 smolt seen

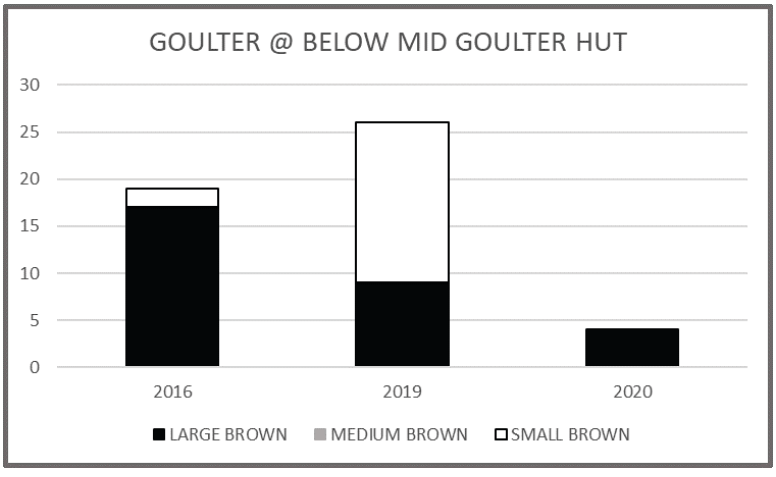
GOULTER RIVER

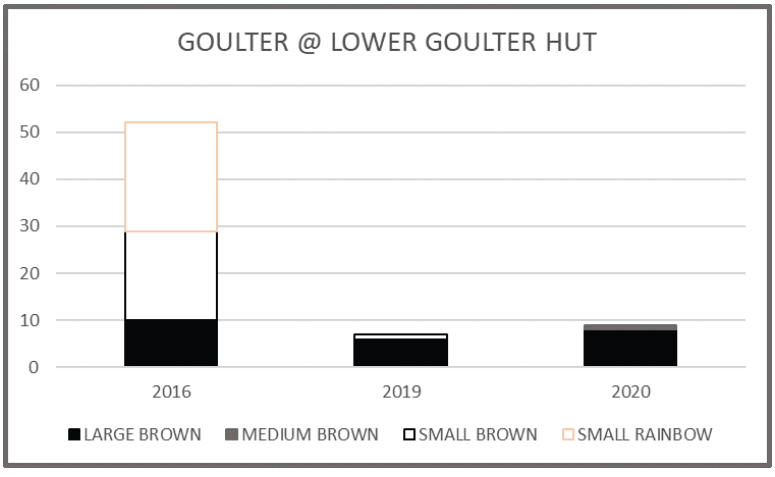
The Goulter can often remain fairly stable in times of high intensity rain events with Lake Chalice acting as a buffer for excess water, however it can be seen from the hydro graph that it did not escape the volatility of the December flood event. In fact, between the months from April to December the Goulter had frequent flood events of smaller (but still decent) magnitude. The December flood reached around 330cu, the highest for quite some time (though as it can be seen in the red circle the flow recorder was not working for during Cyclone Winston, so it is not known the magnitude of this event).



The Goulter therefore remains somewhat of a mystery as to why it has not recovered in recent years, for example, between 2011-2013 there were three floods greater than 300cu, and staff cannot recall any anecdotal evidence of a fisheries collapse during this period (though we have no drift dive data evidence of this). This season, even helicopter operators were advising anglers who wished to go in there to think otherwise. Staff are of the belief that pool loss (through gravel infilling) has been a factor in lower fish numbers in recent years, there simply is not enough depth in many of the pools to accommodate the numbers of fish this river is accustomed to. This appears to have also occurred in other wilderness rivers such as the Sabine, D'Urville, Branch, Leatham, and even the Travers to a degree. These are rivers with no direct human habitat influences, purely the hydrological regime.

Last year for the 2019 dive, though trout numbers were far lower than the 2016 dive, the abundance of juvenile galaxiid was astonishing – indicating a very stable period preceding the dive. This years' dive only held four large browns in the site below Mid Goulter Hut, and 8 large and 1 medium in the downstream site below Lower Goulter Hut. Zero smalls were seen over both dives, and only one galaxiid was seen for both dives, indicating the hydrological regime drives both native fish/trout habitat.





Dr John Hayes (Cawthron Institute) is of the opinion that climate varies over 15 to 30 year cycles in NZ driven primarily by the Interdecadal Pacific Oscillation index, and trout fishery declines we are currently observing within some fisheries on Conservation Estate, might in fact be largely driven by the IPO index, rather than any global climate change influence.

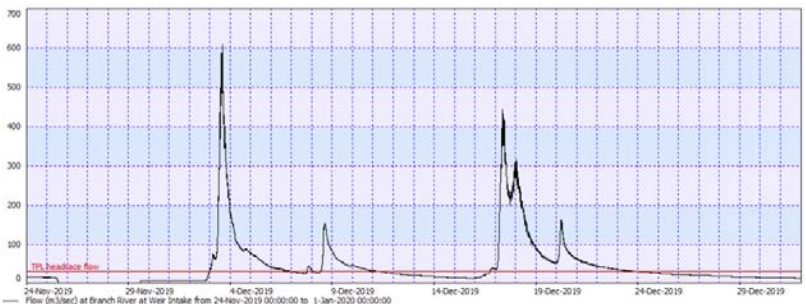
John notes that NZ is now emerging from a period of negative IPO index which delivers less floods (less water yield) and lower low flows in rivers draining the Southern Alps, with the 1980s – 1990s characterised by positive IPO index and late 1999-2014 by negative IPO index. The IPO affects the magnitude and frequency of floods and low flows (and overall water yield) differently in different regions around NZ – but has a much stronger influence on New Zealand's climate variation than global climate change.

Flood and low flow frequency and magnitude are considered to occur over periods of decades in New Zealand with large floods carrying the bulk of the bed-load into rivers which fills in pools and deep runs, and moderate floods (higher frequency of them) then scouring out this bed-load infilling over time, to recreate the longitudinal variation in depth (pools and deep runs) that adult salmonids need.

John Hayes notes that the hydrological signal from global climate change in NZ is quite subtle compared to the IPO and, since it is climate (e.g. IPO climate) that is a bigger driver of the national and regional hydrology, then it is considered this applies to summer temperatures within New Zealand also. Moreover,high temperatures are exacerbated by hydrology (low flows), which is subject to the influence of the IPO. Hence the worrisome high temperatures we are seeing in recent years may be a temporary phenomenon, and with the recent switch to positive IPO index we might start to now see summer temperatures moderating over the next decade or two, with, hopefully a return to more favourable hydrological conditions for trout habitat and trout populations – as experienced in this region in the late 1980's when most of our regional fisheries were in stellar condition. Given the effects on temperature, this phenomenon may be of even more relevance to the current health of our salmon fisheries given offshore summer oceanic temperatures are considered to be a very significant factor here.

BRANCH AND LEATHAM RIVERS

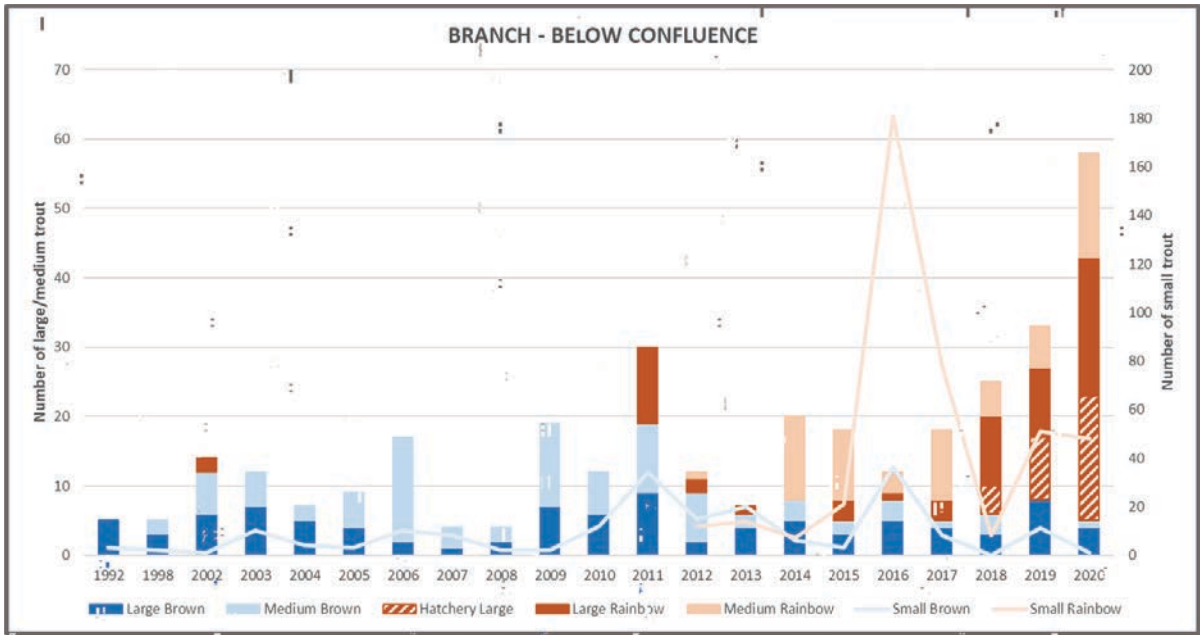
There was some concern about the Branch/Leatham fishery after a huge flood ripped through the catchment in early December. This flood reached 600 cumecs, which was the fourth largest flood in the past 20 years and saw significant change to the river morphology. Just as the river was returning to normal, another significant rain event hit two weeks later which saw the river reach over 400 cumecs. Fish & Game had only weeks before undertaken a heli-release of 400 rainbows into the Branch/Leatham, and it was feared these fish as well as many others, would be lost.



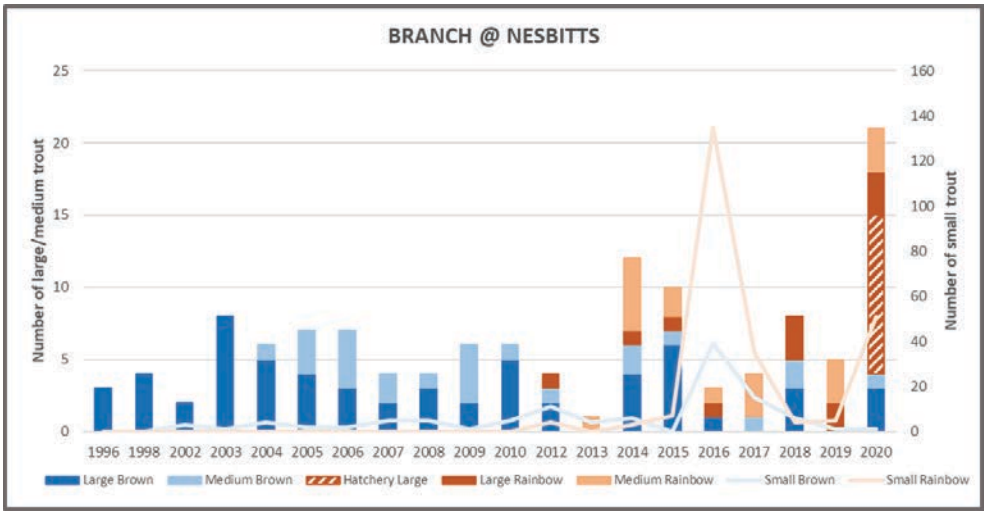
However, in mid-January once the waters subsided, reports of highly successful angling ventures started to filter in, including fish being caught from the recent release. In fact, there were some very happy anglers around. Drift dives undertaken on 30 January saw all fears alleviated, with the highest count at the site below the confluence, and decent numbers in the Leatham at Enchanted and in the Branch at Nesbitts. The high count below the confluence would have likely been due to the large flood pushing some fish downstream, as yellow and green tagged fish had filtered down to this part of the river from upstream – the first time these have been seen this far down.

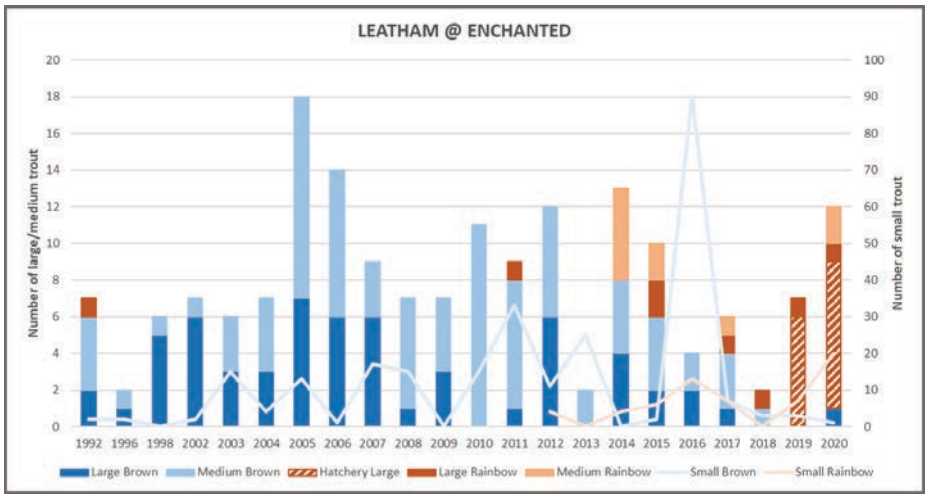
Electric fishing and angling monitoring undertaken in March over three days also revealed some interesting information. Firstly, the trout population in the upper reaches of both rivers was still very good after the flood event. And secondly, the invertebrate life, even 10 weeks after the flood event, had still not recovered. Very few invertebrates were captured in the nets while electric fishing, whereas the year prior, nets were teeming with bug life. Fish condition, therefore, was average in most of the trout caught due to the lack of drifting nymphs available, and fish may have been mostly reliant on terrestrial insects over the summer.

As mentioned, this years' count below the Branch-Leatham confluence was the highest on record, with 38 large rainbows (18 hatchery, 20 wild), 15 mediums and 48 smalls. Four large brown trout were also in residence.



For the Branch at the Nesbitts Creek site, the count of large and medium trout was the best on record with 14 large rainbows (11 hatchery, 3 wild), 3 medium rainbows, 3 large browns and 1 medium brown. While it appears young of the year rainbows took a big hit in the flood, the survivability of yearling plus rainbows was good with the majority of the 51 small fish seen from this cohort.



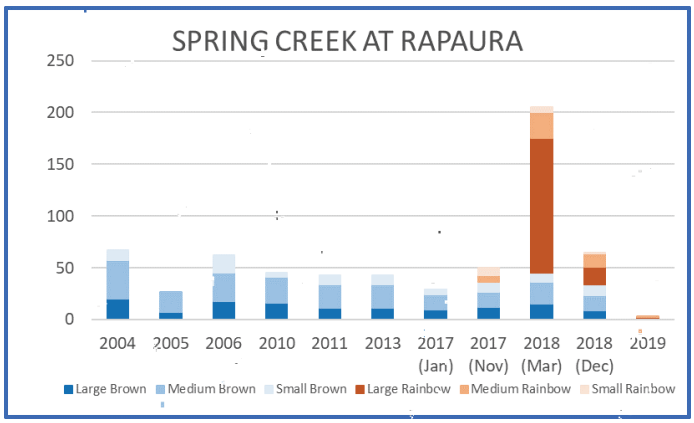


In the Leatham, low numbers of large brown trout in the past few years have been a feature, possibly due to infilling of many of the pools within this reach. Rainbow numbers were decent for this years' dive, perhaps due to their liking for fast riffle/run water, without the necessity to have access to water with depth/structure which brown trout favour.

Just one large brown trout was in residence, and 8 of the 9 large rainbows were tagged or fin clipped hatchery fish. 20 small rainbows were also seen on this dive. These yearling plus fish happily take a fly and put up a lively fight for their size.

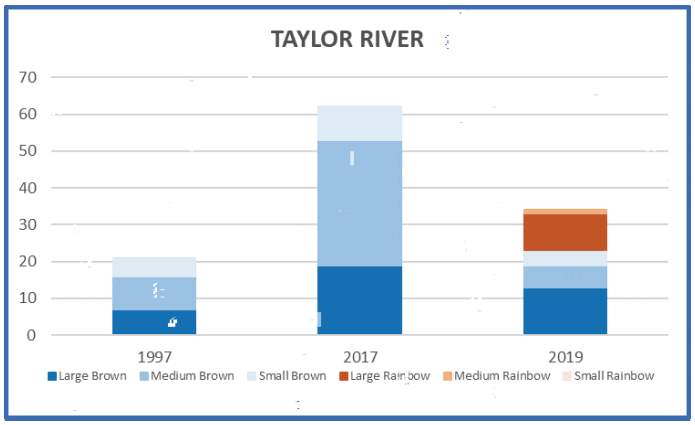
SPRING CREEK

There was reported to be a seal which had taken up temporary residence in Spring Creek near the drift dive site in the weeks leading up to the drift dive in late November. The effects of the seal are clear by looking at the drift dive graph, with the trout population completely plummeting. Just one large and one medium rainbow was seen along with a medium brown – the lowest count on record.



TAYLOR RIVER

It can be seen by the graph that the Taylor is quite a productive fishery, capable of sustaining a reasonable trout population. The dive site is 1km in length, and held 13 large browns and 10 large rainbows, though less medium browns were seen on this most recent dive (as mediums tend to be more transient this is of little concern).



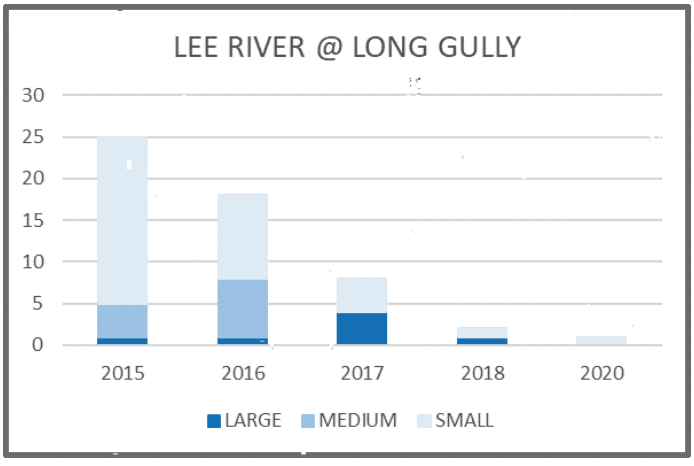
SPAWNING SURVEY

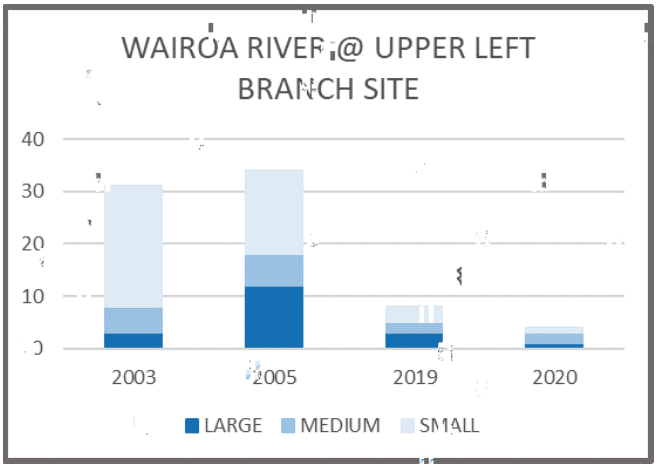
This river was surveyed for approximately 1.5 km on June 11th 2019 from Meadowbank Bridge to the base of the Taylor Dam. There were only very limited areas of spawning gravels available, due to influence of upstream dam stopping gravel movements down the catchment. Only one Redd was located, and no adult fish were seen.

NELSON RIVERS

LEE & WAIROA

Both the Lee and Wairoa make for poor reading with numbers of fish well done on the previous dive. The Lee only held one small brown, while the Wairoa (upper left Branch site) held just one large, two mediums and one small.





WAI-ITI SPAWNING SURVEY

Several sections of this river were surveyed on June 14th 2019 - an upper reach of 7 km from Toomers Rd to Hiwipango was surveyed and zero fish or Redds were located other than two juvenile brown trout. This survey was done in response to a request for Taylors to undertake river works within this reach during the spawning season. In the opinion of staff, it is very unlikely this reach will ever be used now due to: 1) historic straightening/meander removal, 2) historic Crack Willow removal, and 3) a high sediment/fine gravel bedload. The channel is now effectively 90% run/riffle habitat with very significant pool loss.

Over 90% of the Upper Wai-iti is now shallow run/riffle habitat only – historic pool loss due to straightening/snag removals.

Other than sharp corners the only remaining pools are where mature matsudana's have fallen in and blocked the channel, and these pools will be lost once these trees are removed for hydraulic flood flow maintenance. The only hope for this section of the Wai-iti to ever hold trout and mature eels again, will be if future rock repair work incorporates groynes wherever possible, as per global river works consent condition 55 relating to maintaining, and if practicable enhancing, aquatic habitat diversity.

A highly embedded substrate with large quantities of fine silt exists in the 7 km reach below Hiwipango bridge

A lower reach around Arnolds Lane and the lower Brightwater bridge was also surveyed with a total of 8 definite Redds of 3 km being located. Most Redds were near where past installation of rock groynes had subsequently created good pool habitat for adult brown trout.

One of 8 trout Redds in lower Wai-iti, not far from groyne pools

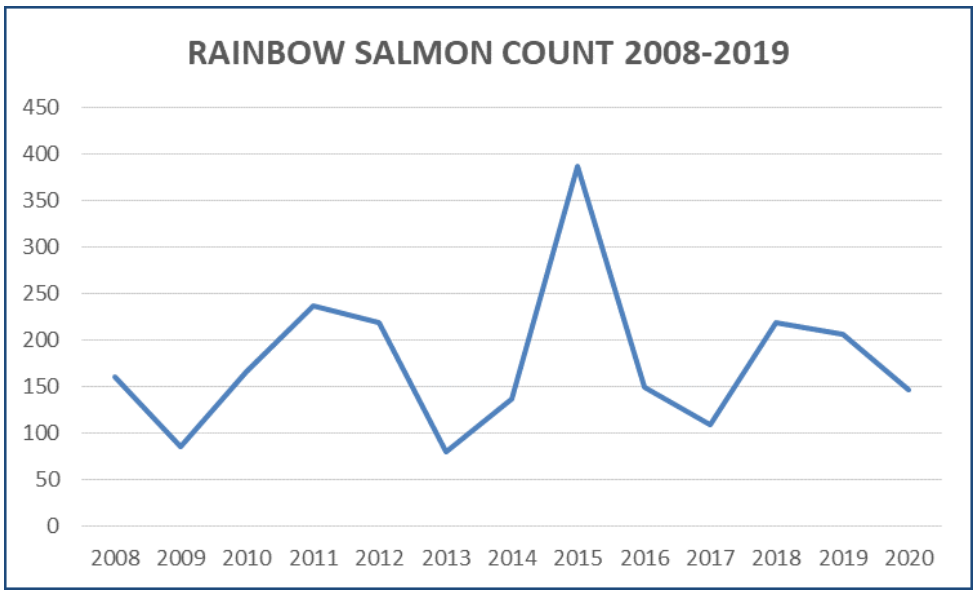
Use of rock groynes as part of erosion repair is now starting to lead to partial recovery of this once fine small river fishery, and Council/Taylors should be commended for this approach, which is in the spirit of global river works consent condition 55 (enhancing aquatic habitat diversity where practicable). The lower Wai-iti is one of the most accessible child friendly fisheries near Brightwater, and further groyne installation should see the fishery improve again in future, for the next generation of anglers.

Excellent Groyne pools 2-3 metres deep – a number of Redds were located not far from here

SALMON

Due to covid-19, an aerial salmon survey was not undertaken for this season and only a foot count of the Rainbow side stream was completed. Few reports came into the office for the salmon season, though staff were aware of some harvest occurring from some of the the dedicated salmon anglers.

For this count, 146 salmon were seen which is slightly under the average count - see graph below.



SALMON SURVEY

The Nelson/Marlborough, North Canterbury,Central South Island and Otago Fish and Game Councils sent out a call for anglers to participate in an annual sea-run salmon harvest survey. The survey comes at a critical time when sea run salmon populations are at depressed levels with the survey covering all sea-run salmon rivers of the South Island east coast, spanning the area from the Wairau River to the Clutha River in Otago.

Monitoring of the sea-run salmon harvest has extra relevance this season as new restrictive regulations were introduced last year to allow a higher proportion of salmon to reach the spawning grounds by restricting angler harvest. The harvest survey gives Fish & Game a tool to assess if the regulation changes are having the desired effects to conserve the sea-run salmon populations.

Rainbow side-stream - location of the ground based salmon count undertaken this season.

BACK COUNTRY FISHERIES MANAGEMENT

New Zealand continues to be on the radar for international anglers, and is seen as one of the best freshwater angling destinations in the world. With this popularity comes management challenges, in particular trying to manage non-resident angling pressure that reduces the impact on the fishery, as well as the aspirations and quality of the experience for resident anglers.

There is currently work being done at national level (with input from the regions) on better management of our pressure sensitive fisheries. A Pressure Sensitive Fisheries Management Review has been drafted by the NZF&G Council, which, among other things, outlines the scope of the issues as well as overseas management regimes which may fit into the New Zealand context. From here, a strategy will be developed, potentially 'cherry picking' the most suitable management regimes from overseas examples with sufficient scope to suit all regions, bearing in mind that there are regional differences in the issues encountered and the management options that will be required.

	Non-Res Whole Season		Non-Res Day		Total LEQ		Resident LEQ		Non-Resident LEQ			
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	%	2019-20	%
Nelson Marlborough	874	838	736	652	4047	4029	3040	3072	1007	24.9%	957	23.8%
South Island	2616	1983	11560	9085								
New Zealand	7041	5989	11560	9085	72,782	68,982	64,867	62,086	7,915	10.9%	6,896	10.0%

Nationally, non-resident LEQ (full licence equivalent) figures indicate non-resident anglers account for ~10% of licence income as seen in the table above. For this region, the figure is far higher at around 25%, which is a significant financial contribution to the region. Note LEQ does not equate to angler effort as non-residents pay a higher licence fee therefore have a disproportionately higher LEQ percentage.

BACKCOUNTRY ENDORSEMENTS - A SUMMARY

Even though the global pandemic caused some disruption to the fishing season, the number of backcountry endorsements (BCE's) were the highest since the inception of backcountry designated fisheries. An increase of approximately 150 BCE's was seen in 2019-20 season, and this was predominantly through resident anglers, though there was an increase of 56 BCE's issued for non-residents also – see table below.

NELSON MARLBOROUGH BACKCOUNTRY ENDORSEMENTS ISSUED

B/C endorsements issued	2016-17	2017-18	2018-19	2019-20
Resident	738	1004	1145	1260
Non-resident	796	1256	1284	1325
Total	**1534**	**2260**	**2429**	**2585**

While non-resident's make up ~25% of the total Nelson Marlborough licence income, over 50% of the 'backcountry endorsements' are made up of non-residents. Actual use of backcountry designated fisheries will be even higher, particularly between November-March, due to many resident anglers obtaining a BCE on the premise they 'may' fish backcountry designated rivers. This is therefore a disproportionate use of effort on backcountry rivers in favour of non-residents.

SUMMARY OF THE RODENT PLAGUE

Interestingly, despite most South island regions seeing an increase in backcountry effort with the rodent plague, the Nelson Marlborough region missed out on much of this action, and though there were some trophy fish evident in some of our rivers, it was nowhere near the extent of the last mouse plague for this region. In other South Island regions, it was a once in a generation event, and a season many anglers will never forget. Some incredible fish were coming out of the backcountry, especially in Westland, North Canterbury and Southland.

A behemoth from the West Coast (photo Anton Donaldson)

A Nelson Lakes double (Blair Daniel)

The Upper Wairau – regional hotspot for the 2015 trophy fish year – was much quieter than expected. Staff were made aware of some double-digit fish being caught here, and saw several in drift dives, but this river simply did not have the number of trophy fish we anticipated and did not receive the attention it is accustomed to. The Goulter too – as evidenced by drift dives and angler feedback – received little attention and was incredibly poor, with fish numbers at its lowest ever and fish condition well below the norm.

In October there were numerous reports of Branch/Leatham trout containing rats and mice which was likely the reason that the fish were in such excellent condition after the winter period (these fish subsequently lost condition due to the December floods).

The rodent plague was marketed well by lodges and fishing guides and it is therefore of no surprise that a good deal of guiding effort was concentrated in other regions where the big fish were, and this is perhaps why the usual quips from anglers and guides about 'too many anglers in the backcountry' were largely muted.

> Branch River rodent munchers (photo Nick King)

SUMMARY OF ANGLER USE - NON RESIDENT / BACKCOUNTRY

This season we asked staff and rangers to spend more time in the Branch and Leatham Rivers. This was done in order to keep abreast of any potential issues arising from increased angler effort (resident and non-resident). In total 77 licence checks occurred on the Branch/Leatham, which was less than expected due to covid, but still provides an interesting snapshot of angling activity within this catchment. For the Branch/Leatham, 19 non-resident anglers were detected equating to 28% of total angler use (excluding guides). Of these, 6 were unguided, equating to 32% of non-resident anglers. This is a fishery that can handle significant use, however the beauty of it is the high percentage of resident anglers who cherish it, and it would be pertinent for Nelson Marlborough Fish & Game to try and keep it as a predominantly resident fishery. Fish & Game will continue to closely monitor angler usage and satisfaction within the Branch/Leatham, as this is a key fishery for this this region.

In other wilderness fisheries (including designated backcountry rivers), 54% of angler effort was from non-residents (total 58 checks), and 79% of these anglers were non-guided.

NON-RESIDENT USE TABLE	Total Licence Checks	Total Non-resident	Total Guide	% Non-resident (excluding guide)	% Resident	Unguided non-resident	% Unguided non-resident
Branch/Leatham	77	19	8	28%	72%	6	32%
ALL OTHER BACKCOUNTRY/WILDERNESS RIVERS	58	28	6	54%	46%	22	79%
LOWLAND RIVERS	108	30	3	29%	71%	17	57%
LAKE ARGYLE	312	5	0	2%	98%	5	100%
TOTAL	**555**	**82**	**17**			**50**	**61%**

In lowland waterways (predominantly Motueka/Wairau/Pelorus Rivers) 29% of angler effort was attributed to non-residents, of which 57% were non-guided. At Lake Argyle, over 300 licence checks were carried out, and just five anglers were non-resident.

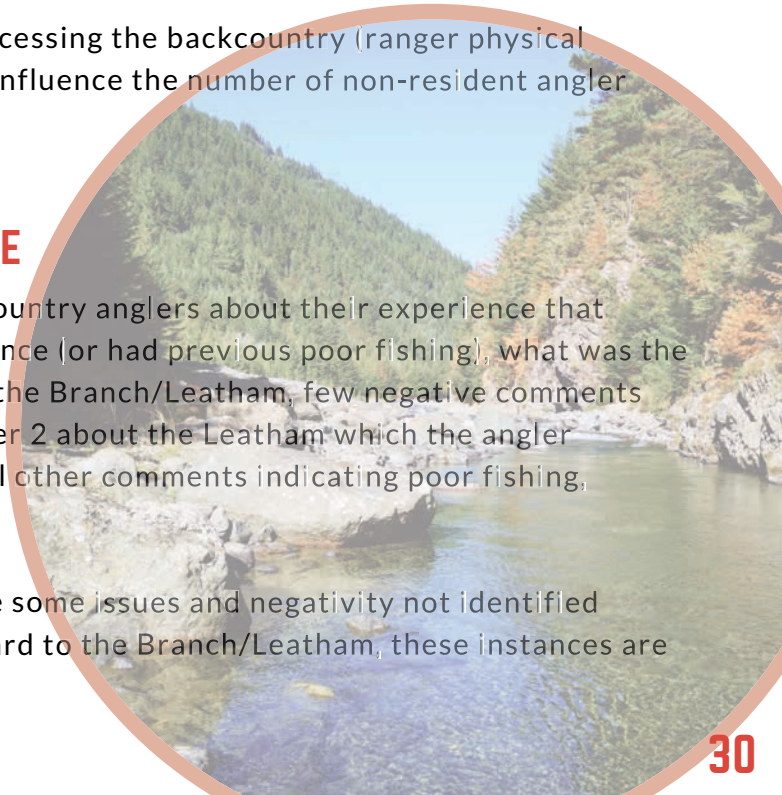
Note, this information is a broad indication of non-resident use and there are several variables at play which can strongly influence rate of non-resident use i.e.,

- Location – if the ranger favours certain rivers which are more/less use by non-resident anglers
- Time of year – if there is more effort early and late in the season the percentage of non-resident usage will be lower, and conversely if more effort is applied during peak tourist season non-resident use will be higher
- Ranger capability – due to complexities with accessing the backcountry (ranger physical ability, time, lack of suitable transport), which influence the number of non-resident angler encounters.

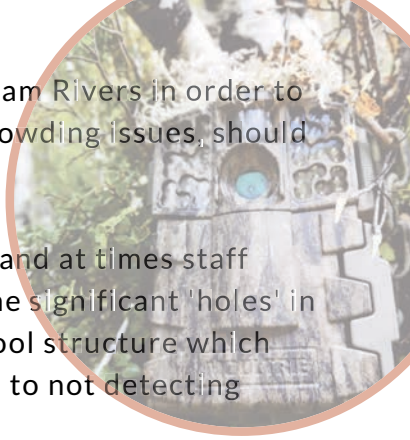
SUMMARY OF BACKCOUNTRY QUESTIONAIRE

This year we asked our rangers to interview backcountry anglers about their experience that day/season, and if they were having a poor experience (or had previous poor fishing), what was the reason. Of the 98 interviews, of which 77 were on the Branch/Leatham, few negative comments were heard. One negative comment was on October 2 about the Leatham which the angler thought was 'overcrowded', and there were several other comments indicating poor fishing, however these were due to discoloured water.

So, all in all, while we understand that there will be some issues and negativity not identified through compliance interactions, especially in regard to the Branch/Leatham, these instances are few and far between on this fishery.



TRAIL CAMERA MONITORING



This season a number of trail cameras were installed in the Branch and Leatham Rivers in order to monitor angler usage. This was done to keep abreast of any potential overcrowding issues, should they arise.

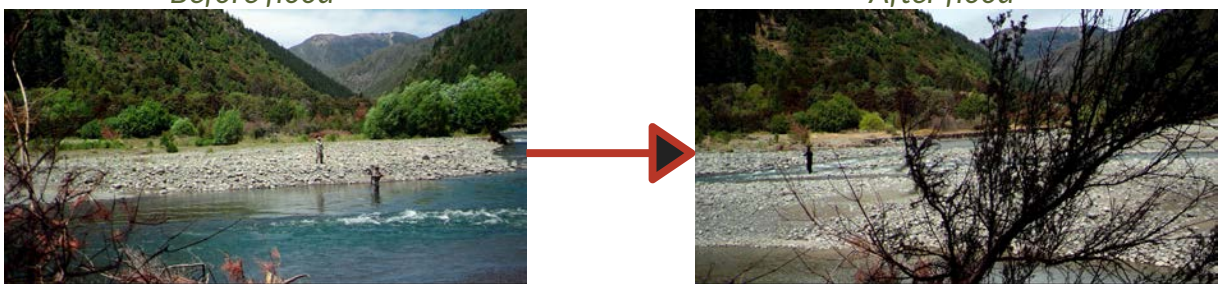
Again, there were some issues with camera's not functioning as they should, and at times staff were not able to replenish battery supplies for the cameras, so there are some significant 'holes' in the sample duration. Floods in December also completely re-arranged the pool structure which the cameras were situated on, and may have likely contributed in some cases to not detecting anglers - see before/after pictures below.

As a result of the some of this years issues, staff consider that not much information from this years camera monitoring programme can be used as an accurate assessment of angler use. Despite this, looking at the evidence available, angler activity at four locations could be considered fairly light in general, though the Leatham during October saw anglers on 20 of the 27 days the camera was in operation.

At the confluence pool from 25 November to 26 February, 20 anglers were seen (approx 90 days). The camera in the Branch (at Silverstream) in the end became unsuitable due to the floods rearranging the pool structure making it easy to miss anglers. In the early season, the Branch received less pressure owing to the ford that vehicles have to negotiate, with many anglers favouring the 'less risky' option of the Leatham over the Branch.

Before flood *After flood*

Confluence pool



Caves Hut

Silverstream

Barbers Ford

NATIVE FISH MONITORING

Electric fishing monitoring of both native fish and juvenile trout was carried out by staff in a number of trout fisheries including the Branch/Leatham, Opouri, Riuwaka, and Rainy Rivers. This monitoring work has two main purposes, firstly, to monitor any potential effects of the regional trout release program on native fish (relative to the impacts of flooding or other factors), and secondly to try and determine what are the specific salmonid population limiting factors within these fisheries.

BRANCH/LEATHAM STUDY

An intensive 3-day sampling trip utilising two electric fishing teams is undertaken within this fishery annually over 15 separate locations within the catchment, mainly utilizing historic sites originally surveyed prior to the Trust Power adult salmonid release program starting in 2010 as mitigation for the Branch hydro scheme salmonid fishery impacts. This work was initiated in order to set-up a monitoring system to assess the health of both native fish and brown/rainbow trout recruitment. This work has now been undertaken 3 times and will be repeated annually every March until a thorough understanding of the relative influence of biotic verses abiotic factors on recruitment of native fish and trout is established within this catchment. Results of the March 2020 survey work were interesting, with very low numbers of both native fish and juvenile trout present within all the mainstem Branch/Leatham sites and in addition most tributary sites, due it would appear, to a very significant flood occurring in December 2019. This flood had a greater than 20-year return period and significantly altered existing riverine habitat within the catchment, as illustrated in the following images taken from one of Fish & Games static trail cam angler usage monitoring sites.

As can be seen in the table below, even most small tributary sites that usually hold a very high biomass of both dwarf and northern galaxiids, had experienced severe population reductions. The most stable monitoring site, a tiny forest clad un-named tributary opposite Caves Bluffs fared the best, but even this site still suffered a reduction of northern, but not dwarf galaxiids. Of interest, is a general historic pattern of high northern galaxiids alongside high juvenile brown trout in some sites, presumably after a significant period of catchment flow stability (not too many large damaging floods). For example, the site in the mainstem branch below the hydro weir (not subject to any restocking influence, and little holding water for adult salmonids), in 1993 held good numbers of both northern galaxiids and juvenile brown trout, whereas in 2019 and 2020 it held nil juvenile trout and only 1 northern galaxiid. In addition, Alan Stream lost almost its entire population of both species of galaxiids, along with the occasional juvenile trout between the 2019 and 2020 sampling visits. Half of this stream site is located above the road which has a small waterfall below it. Juvenile trout have never penetrated above this ford, nevertheless all native fish biomass above the ford had been decimated by the December 2019 flood. Along with determining the relative role of flooding in determination of native fish and trout biomass within this catchment, this work will also give Fish & Game, DOC, and our Treaty Partners, a useful insight into the magnitude of challenges that climate change may bring, in regard to the frequency and magnitude of future flood events and their likely influence on native and trout fishery health into the future.

BRANCH/LEATHAM NATIVE FISH MONITORING TABLE

Year	Location	Area Sampled (m^2)	No. of juvenile trout	No. of dwarf galaxiids	No. of Northern galaxiids	Total No. Galaxiids (per m^2)	Comments
2018	Branch below SH63	200	0	0	0	0	Nil fish caught
2019	Branch below SH63	200	2 Bt	4	0	0.02	7 upland bullies.
2020	Branch below SH63	200	0	1	0	0.005	9 upland bullies.
1992	Branch below weir	80	Bt	occasional	I	ocasional	
1993	Branch below weir	372	11 Bt	1	11	0.032	3 upland bullies, 1 lf eel
2018	Branch below weir	200	1 Bt, 1 Rt	1	0	0.005	4 upland bullies
2019	Branch below weir	200	0	0	1	0.005	6 upland bullies, 1 elver
2029	Branch below weir	200	0	0	1	0.005	1 upland bully
1999	Boulder stream above ford (*1.5km upstream of ford)	50	0	3	0	0.015	28 upland bullies
2018	Boulder stream (*first good riffle above ford)	200	2 Bt	0	0	0	2 upland bullies, flood damaged/sedimentation
2019	Boulder stream (*first good riffle above ford)	200	1 Rt	18	1	0.095	5 upland bullies
2020	Boulder stream (*first good riffle above ford)	200	0	1	2	0.015	3 upland bullies, 1 lf eel
2002	Leatham 150m below Caves swingbridge	400	4 Bt	common	0	?	31 upland bullies
2018	Leatham 150m below Caves swingbridge	200	0	0	0	0	Flood impacted from July 2018 flood 450 cumecs
2019	Leatham 150m below Caves swingbridge	200	2 Bt, 1 Rt	1	0	0.005	11 upland bullies also captured
2020	Leatham 150m below Caves swingbridge	200	0	0	0	0	1 upland bully, flood impacted Dec 2019 (20 yr return size)
1978	Leatham mainstem below Caves bluffs	?	14 Bt	27	0	?	10 upland bullies, 5 lf eels also caught
2018	Leatham mainstem below Caves bluffs	200	0	0	0	0	11 upland bullies
2019	Leatham mainstem below Caves bluffs	200	1Bt	12	5	0.085	10 upland bullies, 1 elver
2020	Leatham mainstem below Caves bluffs	200	1 Bt	9	1	0.05	1 lf eel
2002	Leatham trib. opposite Caves Bluffs	200	5Bt	14	9	0.115	DOC record
2018	Leatham trib. opposite Caves Bluffs	100	0	40	8	0.48	Forested -unaffected by July flood - stable
2019	Leatham trib. opposite Caves Bluffs	100	0	60	20	0.8	1 upland bully - very stable trib.
2020	Leatham trib. opposite Caves Bluffs	100	0	61	3	0.64	6 upland bullies
1990	Bobs Stream (Leatham trib.)	30	0	14	88	1.02	5 upland bullies
2018	Bobs Stream (Leatham trib.)	100	1Bt	9	7	0.16	1 elver captured also
2019	Bobs Stream (Leatham trib.)	100	2Bt	0	2	0.02	Reamed out by flooding
2020	Bobs Stream (Leatham trib.)	100	0	0	6	0.06	7 upland bullies
1993	Branch below Leatham confl.	100	3Bt	4	2	0.06	34 upland bullies - NMFGC record
1993	Branch below Leatham confl.	110	3Bt	4	2	0.055	DOC record
2005	Branch below Leatham confl.	55	2Bt	3	0	0.055	34 upland bullies - NIWA record
2018	Branch below Leatham confl.	200	0	0	0	0	7 upland bullies - impacted by 450 cumec flood (8/7/18).
2019	Branch below Leatham confl.	200	4 Bt	0	1	0.005	10 upland bullies
2020	Branch below Leatham confl.	200	0	1	0	0.005	Flood reamed (20 yr return)
2003	Nesbits above confl. Branch	180	4 Bt	5	9	0.078	Upland bullies common
2018	Nesbits above confl. Branch	200	3Bt, 2Rt	31	3	0.17	4 upland bullies
2019	Nesbits above confl. Branch	140	8Bt, 1 Rt	1	1	0.014	4 upland bullies, 1 lf eel. Flood reamed/all fine gravel now, nil interstitial spaces left
2020	Nesbits above confl. Branch	200	1Bt	1	0	0.005	Upland bully larvae, low inverts/flood reamed
2002	Branch below Nesbits confl.	50	0	5	0	0.1	DOC record
2018	Branch below Nesbits confl.	200	1Bt, 2Rt	5	0	0.025	3 upland bullies, upstream/different habitat from 2002 site
2019	Branch below Nesbits confl.	200	1Bt	7	1	0.04	11 upland bullies
2020	Branch below Nesbits confl.	200	0	0	0	0	zero fish, flood reamed
2002	Branch below May Stm confl.	200	4Bt	14	0	0.07	7 upland bullies, DOC record
2018	Branch below May Stm confl.	200	1Bt	2	0	0.01	400 m downstream from 2002 site
2019	Branch below May Stm confl.	200	5Rt	0	1	0.005	3 upland bullies, 400 m downstream from 2002 site
2020	Branch below May Stm confl.	200	0	0	0	0	Flood reamed (20 yr return)
1990	Alan Stream above confl. Branch	25	1Bt	common	abundant	?	
2018	Alan Stream above confl. Branch	80	1Rt	1	23	0.3	3 upland bullies. Above/below ford sampled
2019	Alan Stream above confl. Branch	80	3Rt	54	10	0.8	4 upland bullies. Flood impacted
2020	Alan Stream above confl. Branch	80	0	1	0	0.005	Flood reamed (20 yr return)
2003	Silverstream above confl. Branch	250	8Bt	2	3	0.02	Upland bullies common
2018	Silverstream above confl. Branch	200	0	2	0	0.01	Flood impacted from large July 2018 flood
2019	Silverstream above confl. Branch	100	1Rt	0	5	0.05	Flood impacted
2020	Silverstream above confl. Branch	100	0	0	1	0.005	3 upland bullies, flood reamed
1990	Greigs Stream above confl. Branch	100	1Bt	0	occ.	?	Unstable
2018	Greigs Stream above confl. Branch	100	1 Bt	0	1	0.01	I eel. Flood reamed
2019	Greigs Stream above confl. Branch	100	6Bt	0	4	0.04	
2020	Greigs Stream above confl. Branch	100	0	0	3	0.03	Flood reamed
2018	Branch below Greig stm confl.	100	0	0	0	0	Flood reamed
2019	Branch above/below Greig stm confl.	200	8Rt	4	3	0.035	Galaxiids all in shallows (<10cm depth)
2020	Branch above/below Greig stm confl.	200	0	0	0	0	Low inverts/flood reamed

The observations around flood damage to native fisheries align with conclusions from a ten-year study undertaken by the Cawthron Institute within the Rainy River (Hayes et. al. 2018) which concluded that the population biomass of dwarf galaxiids, longfin eels, and upland bullies were all driven primarily by abiotic factors (floods and to a lesser extent low flows), rather than biotic factors (salmonid presence). Interestingly, two sites sampled within the Rainy River this March (within the location the Hayes 2018 paper research work was undertaken), also showed a catastrophic reduction of dwarf galaxiid and upland bully biomass, and around a 60% reduction of juvenile salmonid numbers, presumably in response to extended high December flows, followed by low summer flows.

In addition to the 2/3 reduction of salmonid numbers observed within our peak spawning productivity system (Rainy), a number of Upper Wairau, North bank, and several Leatham tributaries were electric fished to assess whether sufficient numbers of brown trout fingerlings existed for a potential harvest to boost hatchery numbers. As with the Rainy, a significant reduction had occurred within all these tributaries also, with fingerling brown trout being in very low numbers or absent from tributaries electric fished which in the past had held reasonable numbers. Staff concluded this was likely symptomatic of the very high December flows the region experienced, which has been shown by Cawthron to negatively affect juvenile recruitment within both the Motueka and also Kakanui River fisheries (Hayes 1995).

Until we get a stable period of only minor floods for 12-24 months within the Branch/Leatham catchment, we will not be able to confirm conclusively the native fishery is predominantly flood driven within this catchment. Hence the importance of continuing the current monitoring work.

Despite apparent flood damage to native fishery biomass within some Branch/Leatham monitoring sites, the number of adult trout present observed during fish catchability work remained reasonably high, although fish were in much poorer condition than the previous monitoring result one year earlier.

In March 2019 fish were in great condition due to a superabundance of invertebrate food, including free-swimming mayflies, and even some Stenoperla stoneflies. In March 2020 however, staff observed virtually no invertebrates whilst electric fishing, meaning the fishery had probably shifted to mainly terrestrial invertebrate food sources, plus an occasional mouse (one or two anglers reported mice in the gut content of fish over the course of the season).

OPOURI RIVER | DWARF GALAXIAS

A healthy abundant population of native fish continues to function within the Opouri River within the location of a small number of tagged adult rainbow trout releases undertaken annually for increasing angler participation/success.

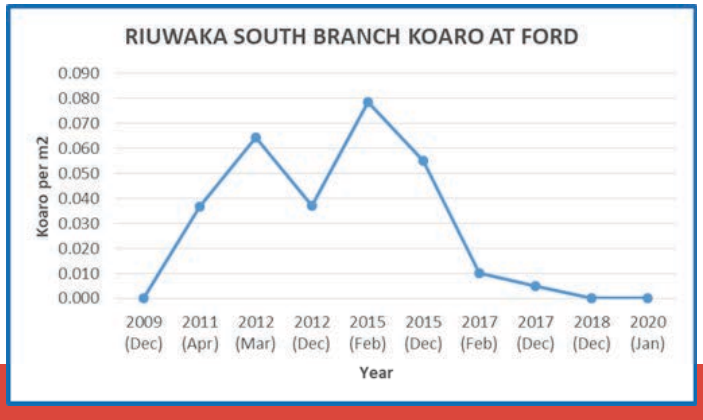
Opouri juvenile trout and native fish monitoring

Year	Location	Area Sampled (m^2)	No. of juvenile trout	No. Trout (per m^2)	No. of dwarf galaxiids	No. galaxiids (per m^2)	Comments
Dec-18	Opouri at Tunakino Bridge	75	5	0.067	68	0.90	5 upland bullies
Nov-19	Opouri at Tunakino Bridge	100	4 rt	0.040	100	1	28 upland bullies,1 sf eel
Dec-18	Opouri at Ronga confluence	56	1 bt	0.018	108	1.930	3 upland bullies
Nov-19	Opouri at Ronga confluence	100	4 rt	0.040	144	1.44	66 upland bullies.

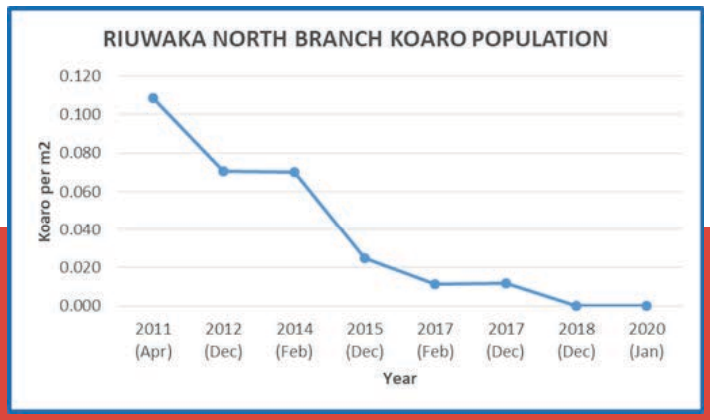
The Opouri River is E-fished at two riffle monitoring sites within a location that adult salmonids are occasionally released to boost the existing fishery when summer drift dives reveal lowered numbers of adults following stream drying or flood events. In 2018, an abundant dwarf galaxiid population at the Ronga confluence site of nearly 2 galaxiids/m2 was observed, along with 0.9 galaxiids/m2 at the Tunakino bridge site. Since this survey work was undertaken the lower Opouri dried up completely at the bottom monitoring site but retained a small low flow at the Tunakino Bridge. Monitoring undertaken in 2019 following this event, revealed the population at the Tunakino Bridge to have fared better numbers wise than the Ronga confluence site, presumably due to the upper site not completely drying up. Since this monitoring however, the lower site above the Ronga confluence, dried up again in February 2020. These sites will be resurveyed again November 2020 to see what the impact of 2 summer drying events in a row has meant for the fishery, noting that Fish & Game currently has an appeal lodged on the Marlborough Environment Plan hearing decisions around low flow management and water allocation volumes within this catchment, as prior to irrigation taking off in the catchment around the year 2000, the lower Opouri went dry less than once per decade on average.

RIUWAKA RIVER

The Riuwaka River has been the subject of significant monitoring effort in the past decade, with annual electric fishing surveys in the North & South Branches to monitor juvenile trout and native fish numbers - see graphs for data on native fish.



Concerningly, the native fishery, particularly koaro, has still not recovered from the impact of Cyclone Gita in February 2018 as illustrated in the graphs and annual monitoring will continue within this Awa-Tapu waterway, which is of great cultural significance to Iwi. Ideally next year, involvement of an Iwi representative with our electric fishing monitoring within this waterway would be valuable.



COMPLIANCE

2019-20 was a busy year on the compliance front with a record number of fishing licences checked, despite covid cutting the season short by around five weeks. A very good total of 555 licence checks was achieved, with over 300 of them coming from Lake Argyle. There were 203 licence checks on all other rivers and lakes, with 40 anglers checks on designated backcountry fisheries and 77 from the Branch/Leatham catchment.

15% of the anglers checked were non-residents, which is similar to 2018-19. It must be said, however, that non-resident use in entirely dependent on where our rangers decide to roam, and the more time spent in the backcountry will see the number on non-resident licence checks rise. Typically, the percentage of non-resident angler use on backcountry designated rivers is around 50%.

You can find more information on non-resident angler use on all fisheries in the Backcountry Fisheries Management chapter.

Total licence checks	**555**	
Total on backcountry designated rivers	40	7%
Total on other rivers/lakes (except Argyle)	203	37%
Total for Lake Argyle	312	56%
Total non-resident anglers	82	15%
Total non-compliant	1	0.18%

Pleasingly, just one offence was detected by rangers, and that was at Lake Argyle while the lake was technically shut down for maintenance (though there was still a sufficient water level to allow for fishing). In many cases, non-compliance levels are at around 4-5%, so to have two years in a row with less than 1% is excellent.

Compliance is so good at Lake Argyle as anglers now understand that there is a heavy ranger presence there, and also that they are very happy to purchase a licence as they feel the region is delivering good 'bang for buck' for their licence fee.

RANGERS AS AMBASSADORS PROGRAMME

This year we ran a very successful "Rangers as Ambassadors' programme. This programme was designed for R3 purposes, but is how compliance should really be managed nationally. The concept is twofold:

Firstly, for the most part the only face to face contact anglers have is with rangers (staff and voluntary) carrying out compliance. In the past few years our compliance rate has been at 99% which is very good. With so many anglers 'doing the right thing', we have few issues to deal with, so there are no reason for a negative or 'lacklustre' interaction. The priority for our rangers engaging with the 99% is to be helpful and courteous yet maintain a professional approach so at the end of the interaction the angler feels the ranger has added value to their day and has had a positive effect. We want and expect them to go above and beyond – it is part of our R3 programme. Remember, we want our anglers to succeed and catch fish. The benefits of having successful anglers are obvious and too numerous to list, but we want to encourage our new and re-activated anglers into the sport for the more successful they are the higher likelihood they will stay. On top of that we need to do our best to retain our current longstanding anglers.

Secondly, many anglers crave information: what is the best technique?, what lure should I use?, where are the fish?, when's the next release? We want our rangers to be able to provide that information and provide it with a smile on their face, and to assist with this we have given away hundreds of starter packs (funded with sponsorship from Nelson Hunting & Fishing) which is a compact lure pack of all you needed to catch fish, whether this was for softbaits, plastic worm, or bubble and fly.

On the packs were QR codes which directly linked the lure packs to the three YouTube video's explaining how to fish each technique. – a compact lure pack with everything you need to catch fish.

The starter pack initiative has gone down a treat with anglers and have been the downfall of hundreds of trout with happy anglers the result. The simple fact is most of our rangers don't have to change what they do at all, they've been doing this the whole time. This programme solidifies our objectives somewhat, and makes R3 a focus for compliance interactions, rather than solely compliance itself.

RANGER IN RESIDENCE - BRUCE MCKENZIE

We were fortunate to have voluntary ranger and summer freshwater advocate, Bruce McKenzie, stationed at Lake Argyle for around 6 weeks over Christmas and into the new year. Bruce is a fantastic ranger with an R3 focus at the forefront of every interaction, and he became well known at the Lake during his time there. He alone, was responsible for upskilling countless anglers, with an ability to get anglers catching fish.

RESOURCE MANAGEMENT ADVOCACY

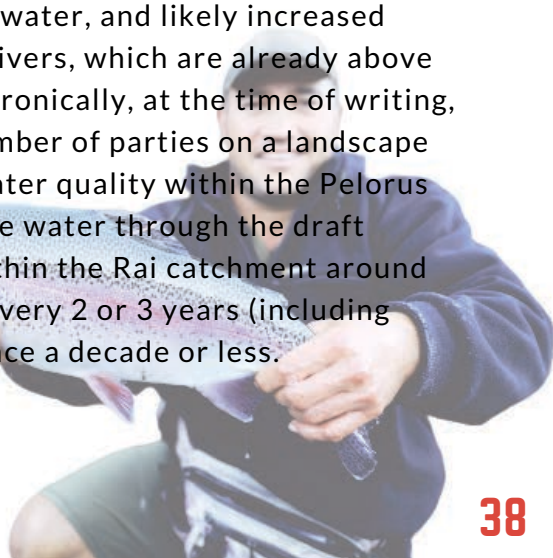
Resource Management advocacy, while not valued or understood well by many licence holders, remains one of our key avenues to achieve improved Local Authority management and retention of the 'natural capital' that supports the fish and gamebird resources. Much Resource Management work often focuses on water quality and quantity issues, which tend to affect salmonids more than gamebirds, however this is appropriate given 80% of Fish & Game's national income (as is the case for this region) is derived from fish licence sales. Unfortunately, it is often an adversarial process costing Fish & Game considerable time and funding resources for legal assistance and the like.

In the case of the Marlborough Environment Plan for example, a total of 97k of national funding over the last three years (along with well over 1000 hours of regional staff time) has been spent, including engaging a hydrologist to tease out issues within the notified draft Marlborough Environment Plan and legal assistance for the hearings process. A similar quantum may yet be needed for formal Environment Court hearings depending upon mediation outcomes. While this is a substantial cost burden for licence holders to bear, it is the only opportunity we will have for the next 20 years to set adequate minimum flow and water allocation regimes within Marlborough to protect recreational fisheries during summer low flow periods.

MARLBOROUGH ENVIRONMENT PLAN REVIEW

Resource Management workloads eased a little for part of this year with the completion of Marlborough Environment Plan hearings. Following the release of decisions however, Fish & Game have had to lodge a formal appeal to the Environment Court as our concerns around low flow and water allocation management were not addressed by the decision panel. The only bright spot in the decision was a reduction in total allocation of new Class B Wairau water from 7.5 down to 2.5 cumecs. A number of interested parties have joined in support of our appeal however, including Iwi, Environmental Defence Society, and the Department of Conservation. Wine Marlborough, Federated Farmers, and some of the larger winery companies have also joined in opposition to our appeal. Depending upon mediation outcomes, the region will now need to apply to the national Fish & Game legal fund for formal Environment Court hearing assistance.

The largest issue of concern within the present plan decisions relate to the provision for allocation of a lot more water out of trout fisheries of interest to Fish & Game, with inadequate assessment or provision for flows to protect instream values. Related to this allocation of new water, are the likely flow-on effects of more intensive land-use arising from new water, and likely increased nitrate leaching rates in catchments such as the Rai and Kaituna Rivers, which are already above levels deemed to be healthy for aquatic ecosystem management. Ironically, at the time of writing, Marlborough District Council is also engaged regionally with a number of parties on a landscape scale conservation project for improvement of biodiversity and water quality within the Pelorus catchment, somewhat at odds with the proposed allocation of more water through the draft Marlborough Environment Plan. Since water allocation started within the Rai catchment around the year 2000 for example, the lower Opouri River now goes dry every 2 or 3 years (including both the last 2 summers) whereas prior to this it happened only once a decade or less.



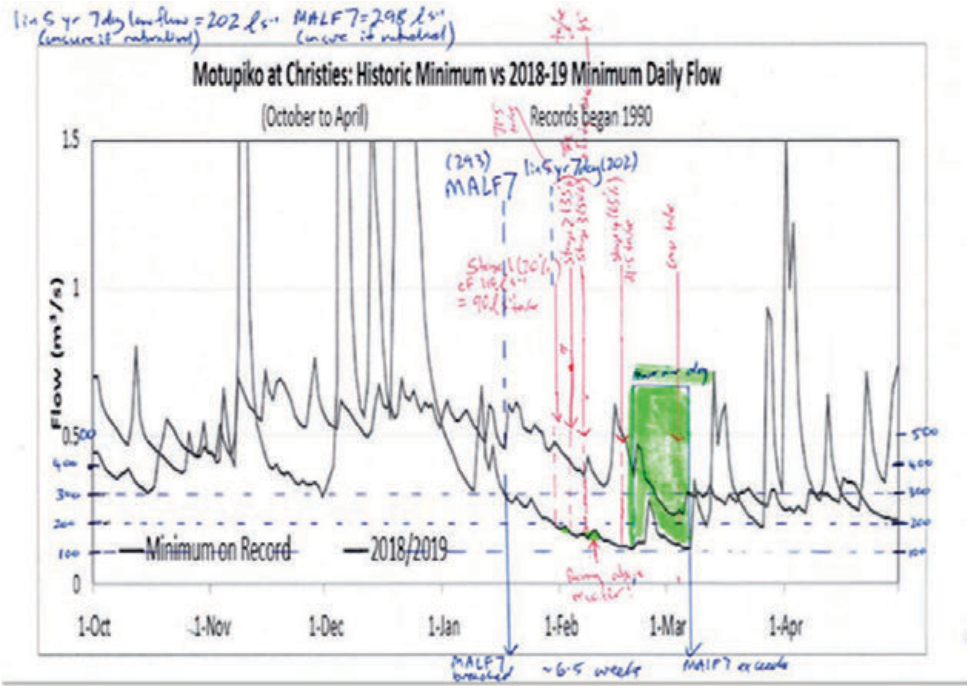
MARLBOROUGH RESOURCE CONSENTS

A number of resource consent applications (both renewals and new water applications) have had submissions lodged seeking 10-year terms only (or in the case of the Rai/Kaituna catchments 1 year), and much higher cut-offs for new water in the Wairau (all new water allocation applications in the Kaituna, Pelorus, and Rai have been opposed and are now on hold), to ensure consistency with our Marlborough Environment Plan submission on these matters. Most applicants so far have agreed these matters are best addressed through the Marlborough Environment Plan hearing and decisions process, and so have agreed to what we sought in our submissions as an interim holding pattern until these matters have been settled, post Environment Court appeals process.

TASMAN DISTRICT COUNCIL PLANNING AND CONSENTS

The February 2020 drought again saw several kilometres of the lower Motupiko and Tadmor Rivers go dry, while catchment irrigators were only on reduced cuts as imposed by the dry weather taskforce. In addition, the Dove River went virtually completely dry again. These rivers are all recognized and protected as “contributing waters for trout spawning and rearing”, within the Motueka Water Conservation Order, however low flow management is left to the Tasman Resource Management Plan, and Dry Weather Taskforce directives, an approach observed to be ineffective during both the 2019 and 2020 droughts. While the Dry Weather Taskforce process itself works reasonably well, the issue currently is the trigger levels within the TRMP which initiate stage one rationing.

Fish & Game believe these are currently set far too low as indicated in the sketch below with 2019 drought restrictions not even starting until the river fell below 70% of MALF at Christies and cease-take occurring at least 10 days after the lower river had already run dry (noting however the sketch below represents worst case scenario of ‘actual’ use equaling total paper allocation, which generally does not occur, although the risk of this happening in future is increasing as Hops development continues at pace).



Currently, due to ongoing concerns being expressed by Fish & Game, Tasman District Council have now engaged the Cawthron Institute to undertake a review of their current hydrological monitoring work to ensure it is fit for purpose to address these concerns during the upcoming TRMP review which unfortunately is not scheduled to occur for another 4.5 years.

Tasman District Councils refusal to even limited notify the 2019 catchment consent renewals saw Nelson Marlborough Fish & Game seek legal advice around our affected party status, in order to try and get TDC to the table to discuss our significant water management concerns in this area. Ngati Tama, Ngati Kuia, and possibly Te Atiawa are also interested in this process as they have similar concerns around affected party status. Council have however renewed these consents due to the current structure of the TRMP, meaning our concerns around low flow management will remain unaddressed until 2025, unless Tasman District Council bring this review forward.

TDC RIVERWORKS UPDATE

Progress continues to be made towards improved practice within the TDC River Engineering Department, with different approaches now being employed within the Motupiko and other rivers (use of groynes and proactive willow planting, in the place of rock riprap). A recent Council commissioned river morphology report has also validated all concerns raised by Fish & Game during the global river works consent hearings process.

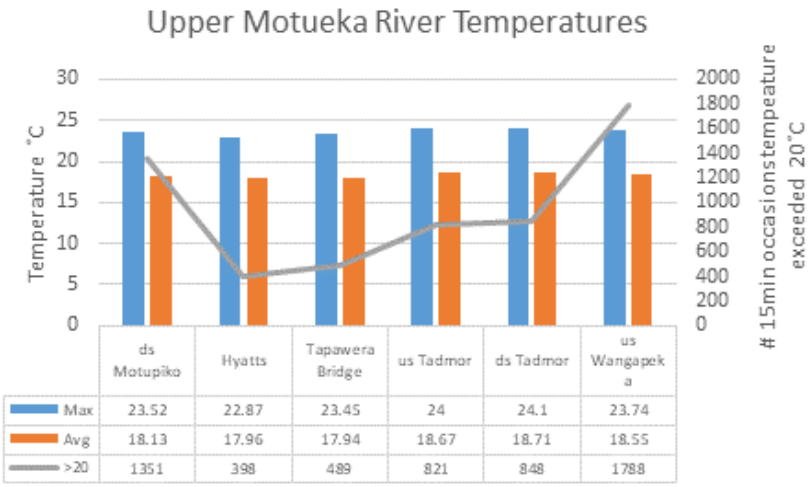
PROACTIVE

The manager has been asked to join the steering committee for the Pelorus catchment project, a recent recipient of $17 million of Government funding – this will be a useful opportunity to try and bridge the gap between Councils water management verses restoration goals. It may also be a useful opportunity to coordinate workshops on regenerative Agriculture for catchment landowners. The project involves collaboration between Iwi, DOC, NGOs, landowners, and Local and Central Government agencies.

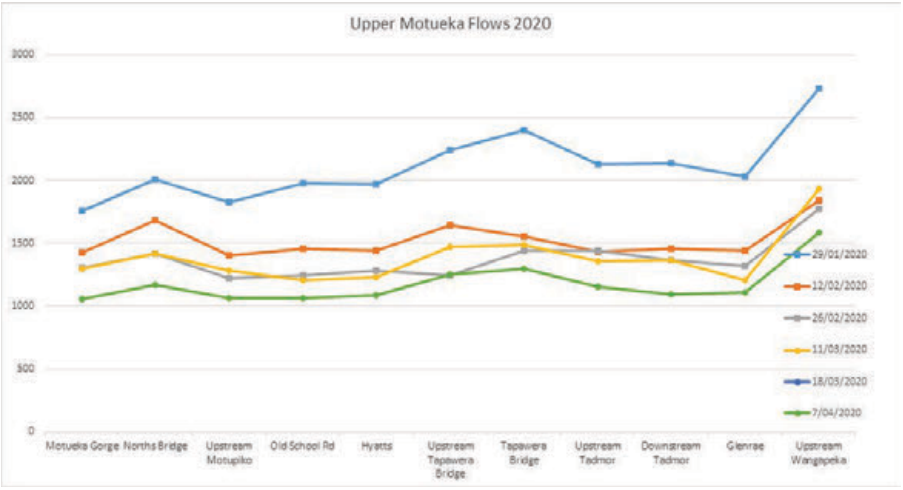
TEMPERATURE AND FLOW DATA - UPPER MOTUEKA

This year temperature data loggers were not deployed by Fish and Game in the Upper Motueka River as Tasman District Council deployed loggers between January and April 2020, as well as carrying out flow gauging data which Fish & Game has obtained. Water temperatures were recorded at 15minute intervals.

As can be seen from the graph (right), while average river temperatures between January and April were 17-18 ˚C, the maximum river temperature reached its highest at 24.1˚C in the vicinity of the Tadmor River confluence. Average river temperatures were also highest in the vicinity of the Tadmor confluence. While average and maximum river temperatures didn't appear to vary significantly between the sites, there was considerable variation between sites regarding the amount of time temperatures exceeded 20˚C.



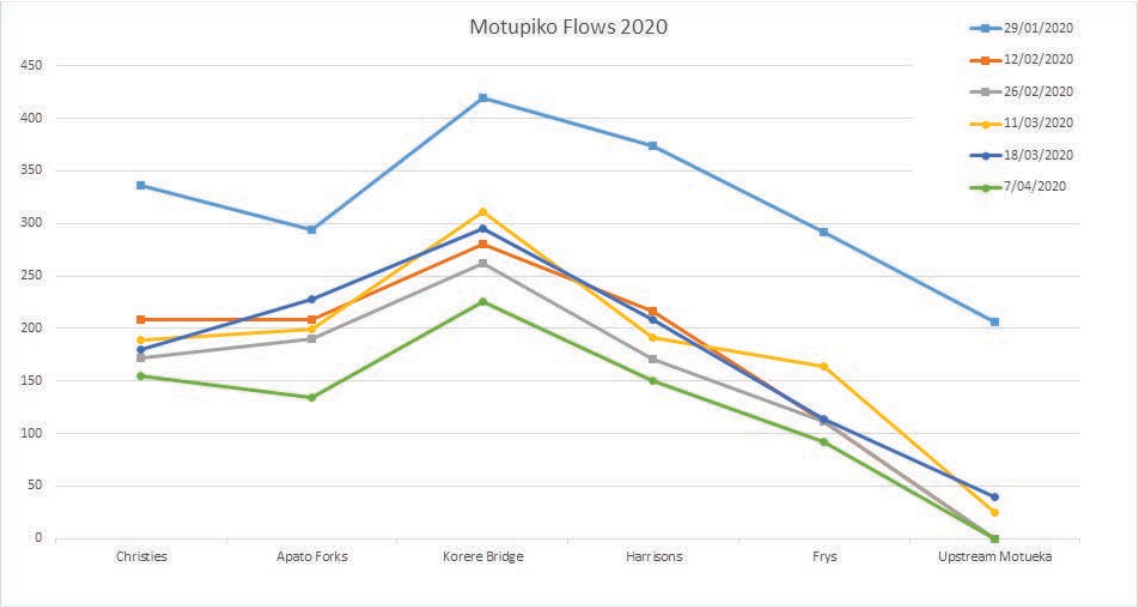
The Motueka River downstream of the Motupiko confluence recorded 1351 (15min) occasions above 20˚C. However approximately 5km downstream at the Hyatts site, the river temperature only exceeded 20˚C on 398 (15min) occasions and is likely to be the result of colder groundwater influences cooling the river temperature. A gradual increase occurred in the number of times temperatures exceeded 20˚C downstream to the Tadmor Confluence (848 occasions). However, in the short distance downstream (approx. 5km) to upstream of the Wangapeka confluence, the temperature exceeded 20 ˚C on 1788 (15 minute) occasions between the end of January and April 2020.



As can be seen from the Upper Motueka Flow graphs (left), at low flows there appears to be losses of river water downstream of Norths Bridge to the Motupiko confluences. There are slight gains downstream of Hyatts to the Tapawera Bridge, and minor water losses downstream to the Glenrae confluence. However, between Glenrae and upstream of the Wangapeka confluence significant increases in flow were recorded.

While this is having some cooling effect, it isn't as significant as previously anticipated and would suggest the water re-entering the river in this location is likely to be more river/surface water origin than groundwater origin which is likely to be cooler.

For the Motupiko flow data, significant water loss occurs in the Motupiko downstream of the Korere Bridge. Despite 50% water restrictions being in place for the Motupiko on 26/2/2020 & 7/4/2020, the river was dry upstream of its confluence with the Motueka.



LICENCE INFORMATION

Covid-19 meant licence sales were down 0.4% at the time of writing. Before covid-19 struck, this region was tracking a few percent higher than the previous year - a good effort with licence sales growing each year for the past three years. A total of 4,022 LEQ's (full season licence equivalents) were sold, down just 18 LEQ's on last year, but well up on 2017-18 still. The loss is entirely down to non-resident sales ceasing in mid-March, as keen be seen in the non-resident part of the table below.

For resident licence sales, most categories were in fact better than last year in Family, Whole Season, Local Area, Junior Whole Season, and Junior Day. Short Break, Long Break and Day licences were slightly down due to covid-19. Winter sales were also slightly down, likely due to the loss of fishing during April, which is a drawcard for winter licence purchases.

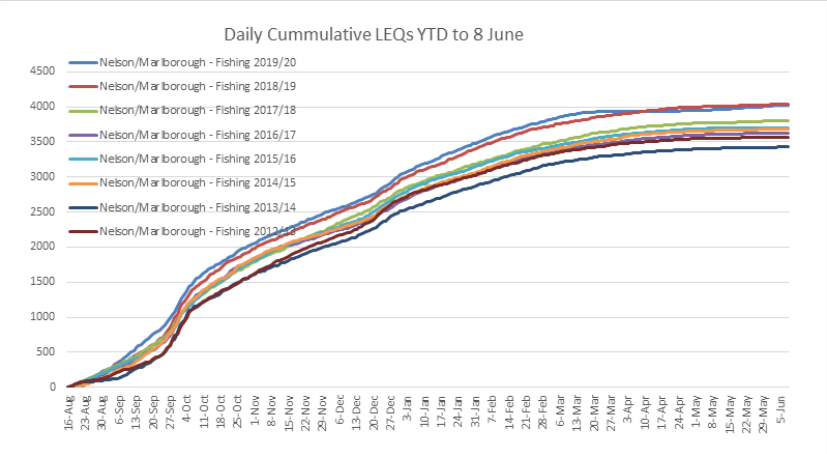
	Resident										Non-Resident				
	Family	Whole Season Adult	Loyal Senior	Local Area	Day Adult	Winter	Short Break	Long Break	Whole Season Junior	Day Junior	Whole Season Adult	Day Adult	Whole Season Junior	Day Junior	Total LEQ
2017-2018	641	1,434	193	131	406	55	116	22	185	64	847	1,272	16	22	3,792
2018-2019	699	1,511	218	188	607	105	117	23	243	61	873	733	27	24	4,040
2019-2020	705	1,526	245	207	560	87	94	17	271	101	838	650	15	14	4,022

Nationally, fish LEQ's were down 5.3% with an income loss of $263,653, and while covid-19 was no doubt a contributing factor, it could be said there is a trend of falling licence sales nationally seen in recent years. In Nelson Marlborough, the very minimal reduction in licence sales contributed to a net gain in income of $8,490 due to the increase in licence fee's between 2018-19 and 2019-20.

	Total Fish	Fish LEQ	Fish Var	Fish $	Inc/Dec
2018-2019 Nelson Marlborough	5,447	4,040		$456,679	
2019-2020 Nelson Marlborough	5,334	4,022	-0.4%	$465,169	$8,490
2018-2019 National	99,862	72,524		$8,198,346	
2019-2020 National	92,494	68,695	-5.3%	$7,944,693	-$253,653

Non-resident licence purchases account for a significant percentage of Nelson Marlborough fishing income, and at around 24-25%, is a very important contribution. Nationally around 12% of fishing income is derived from foreign anglers - see table below.

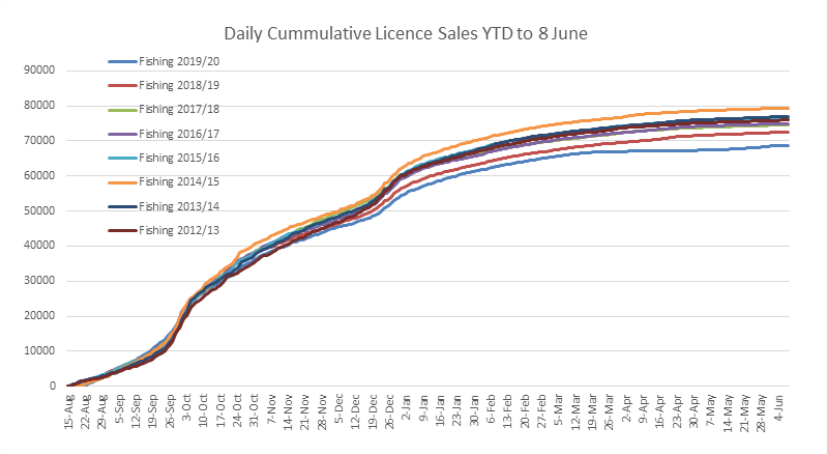
	Non-Res Whole Season		Non-Res Day		Total LEQ		Resident LEQ		Non-Res LEQ			
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	%	2019-20	%
Nelson Marlborough	873	838	733	650	4,040	4,022	3,034	3,061	1,006	25.0%	961	23.9%
National	7,024	5,984	11,439	9,055	72,524	68,695	63,539	61,068	8,985	12.4%	7,627	11.1%



< Nelson Marlborough region

Nelson Marlborough was on track to have another solid year of growth, until covid-19 struck and the trajectory flat-lined (top blue line).

The 2018-19 saw the greatest year of growth since 2012. This has been attributed to our hatchery release programme and R3 initiatives.



< National licence sales

Nationally, this season was the worst in terms of licence sales since at least 2012, and would have likely been so even without covid-19.

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