The Tweed Foundation

2021 Annual Report

Contents

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Front Cover: Tweed Start. Courtesy of Eoin Fairgrieve.

Foreword

As the nation struggled through the ongoing effects of the Covid-19 pandemic and in the face of a difficult fundraising climate for all charities, donations were hard to come by. Having said that, with the generosity of our Friends of the Foundation, targeted campaigns and the support of the RTC, the team were able to complete much of the work programme for 2021.

With the positive Salmon rod catches of 2020 rejoiced, recorded and consigned to our enviable dataset, the expectations of what might be in 2021 had even the most pessimistic of anglers anticipating the start of the season. Sadly, when your expectations outpace reality, it often means you are disappointed. The 2021 fishing season proved to be such! The season proved a challenge for a number of reasons, Covid, very little rain in the catchment after May, leading to low water conditions that prevailed until late September and fewer fish evident. The resulting total rod catch of 5,862 salmon was a huge disappointment.

Of important note, 93.5% of rod caught Salmon were returned safely to the river, reflecting a year on year increase in return rates since 2010. This is the first time the number of rod caught fish has exceeded 90% and demonstrates how angling practices continue to evolve on a voluntary basis.

In addition to the annual monitoring grant, the RTC continued to support the Tweed Foundation in the smolt studies, with a focus on the effect of predation on smolts while in the river. The river conditions for the smolt migration period in 2021 were very different to the low water conditions in the two previous years. Good flows in the river at the time of the smolt run ensured that in 2021 survival rates of the tagged fish was very good, in excess of 80% with the same tag as previous years surviving in the main river to reach Berwick. The study is also looking at the effect of the tags themselves on the possible mortality of the smolts. This aspect of the study is supported by Marine Scotland Science (MSS) and will be continued through to the end of Spring 2022. We will publish a report when the data and analysis is released by MSS.

Now in the fifth year of operation (including 2022), the Gala smolt trap continues to provide new insights into the smolt migration patterns for a Tweed tributary. As detailed in the first section of our report 'Celebrating the Gala Water', the trap allows us to collect biometric data such as fish length, age structure and by PIT tagging a sample of fish, return rates back to the Gala Water.

The Ettrick and Gala counters operated for 2021 without any issues and the Whiteadder counter was upgraded with financial support from Ahlstrom-Munsko. With the Whiteadder counter out of operation for around a month, a final total could not be produced, but it is now producing crystal clear video clips of Spring Salmon, Sea Trout and Brown Trout. All three of our counters have now been upgraded to produce the highest quality of data possible, helping us to provide accurate data that can inform management decisions. The reported Salmon totals for the Ettrick and Gala were below average but given the poor catches on the river in 2021, the totals were higher than many would have expected.

While the TF and RTC Fishery Officers maintain our regular monitoring of the Tweed Goosander and Cormorant population, we continue to develop our in-house knowledge base on their potential damage to the fishery. The dietary analysis work commissioned by Marine Scotland Science has been extremely protracted and ultimately may not provide the resolution of results that we are looking for. We are currently remedying this issue by developing our own ability to process birds shot under licence for dietary analysis.

Another small step forward was the tagging of six Goosanders with a tag that allows birds to be tracked using GPS, with the data downloaded through the phone network. The work was undertaken through funding from Scottish Government as a joint contract between The Tweed Foundation, British Trust for Ornithology, Game and Wildlife Conservation Trust and Centre for Ecology and Hydrology. At the time of writing, the report has not been released, so unfortunately we are unable to present any of the results.

On a sad note, we said goodbye to biologist Kenny Galt as he joined the Galloway Fisheries Trust. A well-respected biologist and angler, I do not think we have seen the last of Kenny on Tweed! The Duchess of Sutherland also retired as a Trustee after many years' of diligent service, we are thankful for her longstanding support and encouragement.

We welcomed two new members to the team in Jonny Archer and Suzi Taylor; both have already stamped their identity on distinct projects and I am certain you will hear more from them in the coming years.

Lastly, I would like to record my thanks to the enormous commitment shown by the members of the Tweed Foundation Team and the RTC Fishery Officers during 2021 and for their delivery of a number of important projects, in particular the Smolt tracking study. I would also thank our supporters and in particular the Fallago Environment Fund and RTC who provided generous sponsorship of the smolt tracking project and all our other sponsors and those with whom we work for their help and support over the year.

Jamie Stewart
Director

Kenny Galt : A fishing rod in one hand, a pint in the other

Following on from the departure of Dr Campbell into retirement, Kenny Galt, The Tweed Foundation Trout and Grayling Biologist had moved on to The Galloway Fisheries Trust after 17 years of employment with us.

Kenny started with The Tweed Foundation at the inception of the Tweed Trout and Grayling Initiative, a project that was designed to work with Trout clubs to better understand and manage Trout and Grayling populations. Originating from Ayrshire, Kenny learned to fish for Trout the old fashioned way, with worms and spinners before progressing to the noble art of fly fishing. Arriving at the Tweed Foundation, his angling skills quickly evolved and improved to a level that would have allowed him to hold his own in national competitions if he had chosen to do so. Through working with Tweed angling clubs, Kenny fished every part of the Tweed catchment and was probably the greatest 'travelled' Trout angler on the river.

In addition to his angling skills, respect from fellow anglers was earned by Kenny through his dedication to the job, which included the social aspects of the Earlston Grayling competition, with early retirement from the river often made to the Black Bull in Earlston.

Under Kenny's stewardship, our knowledge of Trout and Grayling in the Tweed catchment has progressed beyond all recognition. Often putting in his own time in the evening and weekends, we now have a much better understanding of the Tweed Trout populations through the operation of Trout traps in a number of spawning burns. In recent years, the advent of spot pattern recognition software has allowed anglers to take pictures of Trout that can be checked against a database of previous submissions. This has provided us with a unique insight into how often Trout are caught (often a number of times in the same year) and the fact that they are often caught in the same location in different years. In one instance the same Trout was caught on the same day by two friends, who were unaware of the repeat capture while fishing. Kenny has also overseen tracking work of Brown Trout which has started to provide the first insights into their migratory patterns at spawning time.

Kenny has also been an integral part of the Tweed Start, the initiative aimed at promoting angling for children. Often starting with a fish related bad joke or two, Kenny introduced many children to the fascinating world of bugs and beasties, along with helping them to cast for the first time.

The Trout of the Tweed probably breathe a sigh of relief with Kenny's departure as a few less fish will be caught each year, but we hope to see Kenny return to fish some of his old haunts. Almost as certain as Aberdeen football club, Kenny's beloved team, will never win the Scottish premier league, we will see Kenny at future Earlston Grayling competitions.

Celebrating the Gala Water

Since 2018 there has been a sustained effort by The Tweed Foundation to improve our knowledgebase for the Salmon and Trout of the Gala Water, by monitoring every part of their in-river life cycle. This adds to the evolving fish counter technology that we have been using since 2008 to monitor numbers of returning Trout and Salmon. A data series of 10-15 years will allow us to determine how many Salmon are needed to adequately spawn the Gala Water and maximise production of smolts. Determining an accurate spawning target is a fundamentally important question for Tweed Salmon management as it determines the level of restrictions, in particular catch and release, which need to be put in place for the Salmon fishery. At present, we do not have Tweed specific data, meaning that we can only use reference values from other rivers as some context to the number of eggs that we estimate to be deposited every year. For the different strands of work that have been undertaken that can be separated into the different stages of the life cycle, it has taken four years to start overcoming the technical challenges of utilising monitoring equipment in a spate river that appears very benign in low water but is very destructive in high water.

Egg Deposition

As well as estimating numbers of adult Salmon that return to spawn every year, the length of each fish is also recorded. The accuracy of the length data generated from the VAKI fish counter, combined with species identification for a reasonably sized population of at least 700 Salmon is extremely rare, perhaps unique in the UK. Based on previous work that we have carried out to define the relationship between the length of Salmon and egg number in females, we can estimate the total egg deposition for the Gala Water to compare to reference egg deposition figures. Estimated egg deposition is more important than using numbers of Salmon as fewer returning fish could be compensated for by larger fish with a higher fecundity.

Incorporation of egg deposition estimates into our assessment is therefore an important and essential step forward for providing more informed management.

Egg samples have taken from fish at a local smokery to define the relationship between length and egg number.

Fry and Parr

In the last five years, under the banner of the National Electro-fishing Programme Scotland (NEPS) led by Marine Scotland Science[1], there have been significant developments in the methods that can be used to monitor and assess changes in Salmon and Trout populations. The developments include 1) a radical change in site selection to cover all river habitat types (run, riffle, pools and glides) 2) a method that can convert data collected from one sweep of a river section to a density which is normally generated from three runs 3) the ability to compare results to a benchmark (results expected with good spawning and habitat) and 4) an estimate of total production of Salmon fry and parr.

While the method is statistically robust, it is time consuming to complete, with only 30 sites sampled for an assessment of the Tweed catchment and it is currently limited to 2nd to 4th Stream order streams. The Gala Water is of an ideal size for this sampling method, with a 21 site panel developed for us by Marine Scotland Science, which we have used to electro-fish sites in 2020 and 2021. As the sites are relatively close together, surveying can be completed within a week.

By defining the relationship between number of adults, egg deposition and total fry and parr production in the next 10-15 years, we will then be able to establish an egg deposition target above which the benchmark is achieved. At present we can only compare annual egg deposition to reference values. At the time of producing this report we did not have the results for 2021, which will be particularly interesting as we had a record egg deposition of over 3000 eggs per $100m^2$ in 2020 (details in the 2020 Tweed Foundation annual report).

Smolts

Work started with the installation of a Smolt trap at the Skinworks cauld in Galashiels in 2018. As well as being able to collect biometric data about smolts leaving the Gala Water, in particular their size, age and run timing, our aim is to estimate the annual production of Salmon and Sea Trout smolts, something which has not been done before in the Tweed District. The most common method of capturing smolts is in a rotary screw trap, which is a floating metal structure with a rotating drum that funnels smolts into a holding box. While it can be an effective means of catching fish, extreme care needs to be taken to avoid damage from floods and the trap needs to be installed and removed every year. As a more permanent, low maintenance and cheaper alternative, we created a bypass channel at the Skinworks cauld in Galashiels to divert a proportion of the smolt run into a trap. Fish then run over a grill into a trough to then swim into a holding box for processing.

A sunny day, sampling on the Middle Gala Water.

[1] https://www.gov.scot/publications/national-electrofishing-programme-for-scotland/

Celebrating the Gala Water

For traps that capture a proportion of the population, a common method of estimating the total population is to mark a sample, typically with a blue dye mark on the underside of the fish, return them upstream and see how many pass back through the trap to calculate the trap efficiency at different flows. As reported in the 2020 annual report, in the first three years it became apparent that marked fish did not behave as expected by immediately passing back downstream, with fish remaining above the trap for up to a month afterwards. In this period, an unknown number could be eaten by predators that are regularly observed in this area and it is unclear whether marked fish caught in the trap are reluctant to enter it a second time. As we need to calculate the trap efficiency at different river levels, dye marking was considered too unreliable and was ended in 2020.

Going back to the drawing board, a new idea was to tag fish with PIT tags upstream of the trap and operate a detection antenna on the bed of the river downstream of the trap. By recording PIT tagged fish that are caught in the trap and seeing what proportion are then detected by the antenna further downstream relative to detections of tagged fish that went over the cauld face, we can then calculate trap efficiency at different flows. 2021 was the first year that we tested this new approach for estimating trap efficiency. Data collected in late April provided the first indication that this method could work, with a trap efficiency of 4.7% calculated for a three day period. The significant rise in water level then took most smolts out of the Gala Water in early May, leaving no fish left to tag or be detected. Over time we will need to build up a dataset of trap efficiencies at different flow levels, allowing us to then estimate the number of Salmon smolts that leave the Gala Water.

The first two fish caught in the Gala trap.

While we have to be patient in the development of a method to estimate smolt output, an important insight from the Gala smolt trap is the pattern of run timing through the smolt run. Figure 1 shows the cumulative number of Salmon smolts caught in the trap. It is important not to interpret the results as actual numbers as the efficiency of the trap will be dependent on water levels. The first finding is that most smolts are caught in May rather than April and there are negligible movements in the first two weeks of April. Also, in cold Springs and low water, which was the case in 2018, 2020 and 2021, there is a step change in the number of movements between the 2nd and 7th May. These findings are particularly important in the context of predation by Goosanders and Cormorants in the main river and the interpretation of dietary analysis results that have been carried out. The extensive studies carried out in the 1990's using samples collected in April were previously interpreted as being part of the main smolt run, when larger samples should have been collected from May as well. The consumption figures used for the assessment of economic damage to the fishery are therefore likely to be underestimates and need to be updated.

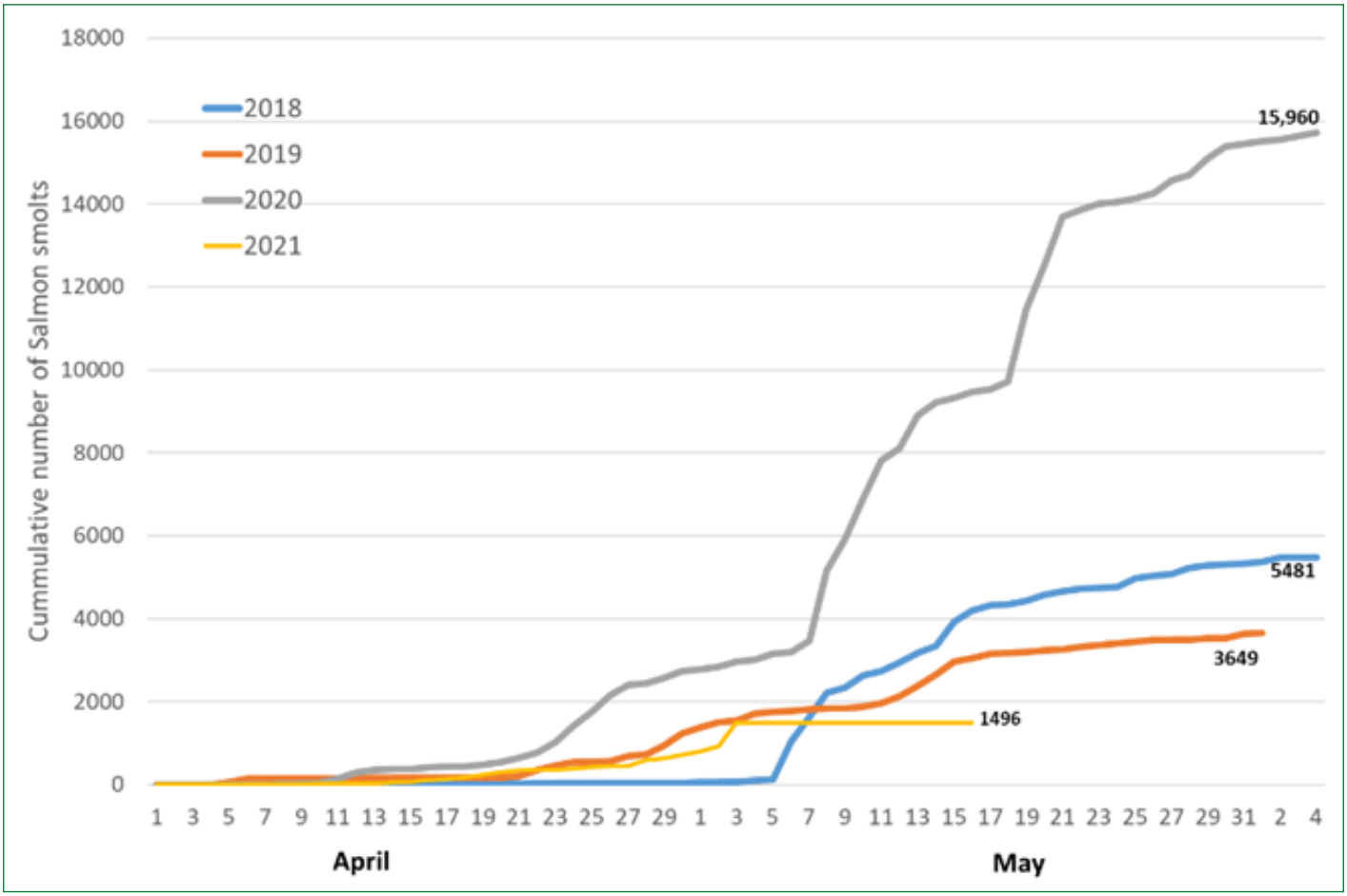


Figure 1. Cumulative totals of Salmon smolts caught in the trap through April and May.

Adults

The Ettrick and Gala counters are the largest catchments that we know of in the UK or Ireland that have accurate counts and length data from VAKI infrared counters. Other rivers, such as the Northumberland Tyne, have resistivity counters, but they require significantly more validation time and do not generate accurate lengths, which is needed for egg deposition estimates. In 2020 the Gala counter was upgraded with a new nitrogen filled cone in front of the camera which significantly improves video quality for species identification. No further fish counter developments are anticipated, other than trying to create a live link from the camera to our website.

Another dimension to our assessment of adult Salmon and Sea Trout is to determine return rates back to the Gala Water. Starting in 2019, we have been tagging around 1,000 Salmon parr or smolts every year and in 2021, we tagged just over 400 trout smolts at the trap. At present, there is almost no knowledge of return rates of Sea Trout in the UK.

A typical coloured Salmon passing through the fish counter.

The development of an accurate detection system for returning fish with PIT tags has not been straightforward. The initial hardware was found to be of a poor quality, but we did manage to use this equipment to detect nine fish returning in 2020, having been tagged in 2019 and spending one year at sea. New equipment was installed in 2021, with a major improvement being the attachment of the detection antenna to the fish counter, allowing lengths and video clips of each tagged fish to be recorded. However, a detection issue was found after the main run of 2021 due to interference generated from the electrical output of the fish counter. Unfortunately an unknown proportion of returning tagged fish were missed. Despite the issue, eight returning Salmon were detected in 2021, six of which were tagged in 2019 and two in 2020. Eight Brown Trout that were caught in the trap going downstream in April 2021 or by electro-fishing the lower Gala Water were detected going back upstream in October. As Brown Trout are repeat spawners, with enough tagging we could gain valuable insights into their life history.

With the detection antenna working properly in 2022, it will be very interesting to see how many returns we get for both Salmon and Sea Trout.

The Future

There is a reasonable point to be made that we could be judged to be over focussed on the Gala Water at the expense of work on other parts of the catchment. However, the opportunity to have an accurate adult fish count combined with smolt output and a catchment that is ideally suited to monitoring fry and parr for total production estimates is a unique opportunity and will in time produce valuable data comparable to other monitored rivers in Europe. After five years of developments on the Gala Water (if 2022 is included) and with extra staff in place, we now have the scope to investigate the Ettrick catchment with its Spring Salmon population, which could include the operation of a smolt trap at the same time every year as the Gala Water. As the Ettrick catchment is six times the size of the Gala, estimating smolt output or designing a similar monitoring network for Salmon fry and parr will be more challenging and may not produce the same resolution of data. However, if we are successful, then we will have a higher level of monitoring for a Summer stock (Gala) and earlier running stock (Ettrick).

Adult Salmon : How many are caught more than once?

Rationale: *The annual rod catch, combined with the exploitation rate (the proportion of fish that are caught at different times of year) provides an estimate of the adult Salmon run. An important consideration is whether Salmon recaptures are influencing the rod catch figure, which can be investigated by floy tagging rod caught adult Salmon.*

A fish about to be returned with a coloured floy tag attached.

Floy tagging is a commonly used method for applying an external tag to a range of different fish species. The floy tag which is also known as a T bar tag, is inserted into the muscle tissue below the dorsal fin using a tag applicator, with the 'T' part of the tag passing through the bones below the dorsal fin for extra purchase. By floy tagging samples of fish, either at a hired netting station at the bottom of the river or by anglers, we can estimate the proportion of the population that is captured (known as the exploitation rate) and the numbers of fish that are caught more than once.

An important question is whether the number of recaptures could be an underestimate due to tag loss or under declaration. There is not a large amount of evidence for tag losses; a small sample of 16 Salmon from the Welsh Dee found only one tag had been lost (6%)[2]. A larger study in Norway which involved double tagging Salmon produced an estimated 13% loss of tags[3]. Under declaration cannot be measured but it seems reasonable to think that anglers and boatmen would report most tagged fish out of curiosity to find out a bit more about the history of the fish they have caught and we have a good working relationship with beats on the river.

With the increasing trend for Tweed Salmon to be released (93% in 2021), there is an important question about the effect of this on the catch totals: do released fish, caught for a second time, now make up a significant part of the annual catches? To help answer this question, in 2020 and 2021, Tweed boatmen from a total of 24 beats tagged fish with an external floy tag to see how many are then recaught. We are very grateful for the boatmen or anglers that participated in this scheme.

The number of Salmon that were tagged each year was very similar, although the numbers in each month are quite different due to Covid restrictions and fishing conditions. Some Sea Trout were also tagged, although the sample size is quite small. It is important to note that Covid will have affected fishing effort at different times, which will in turn affect the recapture rate.

2 Dee stock assessment programme annual report. 1993.

3 Thorstad EB, Diserud OH, Solem Ø, et al. The risk of individual fish being captured multiple times in a catch and release fishery. Fish Manag Ecol. 2019;00:1–10. https ://doi.org/10.1111/fme.12407

Adult Salmon : How many are caught more than once?

The numbers of Salmon and Sea Trout tagged each month

Month	Salmon		Sea Trout	
	2020	2021	2020	2021
February	2			
March	43	17	1	
April	4	43		
May	23	65		
June	75	28	1	
July	91	21	4	10
August	62	85	1	8
September	79	76	2	15
October	16	78		1
November	2	2		
Count	**397**	**415**	**9**	**34**
Corrected count using 13% tag loss	**345.4**	**361.1**	**7.83**	**29.6**

While there were Covid restrictions that would have affected fishing effort in both years, the periods of river closure were relatively small and did not coincide with the main run of Salmon in June and July. Recapture rates for both years with an estimated 13% tag loss (using the figure from the Norweigan study) were relatively small, with a 4.9% recapture rate calculated for 2020 (17 recaptures) and 3.6% for 2021 (13 recaptures). Each year was very different, with a greater abundance of Salmon in the river in 2020 and unfavourable fishing conditions from June to August in 2021. Even though the two years were very different, the recapture rates are very similar. Only one fish was recaught twice; fish number #565 was caught at Sprouston on the 6th May 2021 and recaught on the 10th May at the same location and then at Makerstoun, 95 days later.

The period between tagging and recapture were variable, with times shown in Figure 1 ranging from 4 to 118 days (excluding kelts that were caught the following year). Evidence from captures of floy tagged fish that were tagged in the estuary is that most Salmon are caught in the first month and then go off the take. The results for tagged fish caught by rods is therefore different, with the same number recaught within 30 days as the number after 90 days.

17 out of 24 recaptures were within 10 km of the original capture point, eight of which were on the same beat. Only two of these were within ten days, with the remainder between 43 and 101 days. With the exception of one fish that dropped down a kilometre from Carham to Lower Birgham, captures were at the same location or further upstream.

The small recapture rates in 2020 and 2021 are too small to have any significant effect on the annual catch totals, as it would mean that for every 1,000 fish recorded, just 43 would have been caught twice (using an averaged recapture rate for both years). In an annual catch of 5,000 therefore, only 220 fish would have been "recycled" and for a catch of 10,000, just 440.

Other interesting information

While the primary reason for floy tagging fish is to see how many are caught or recaught, we can also glean other bits of information. One fish caught at Upper Dryburgh in July 2020 was caught on the Leithen Water in November 2020 while electro-fishing. Two fish tagged in 2021 at the Lees and Gledswood were recaught as Kelts in 2022 at Birgham Dub and Middle Mertoun.

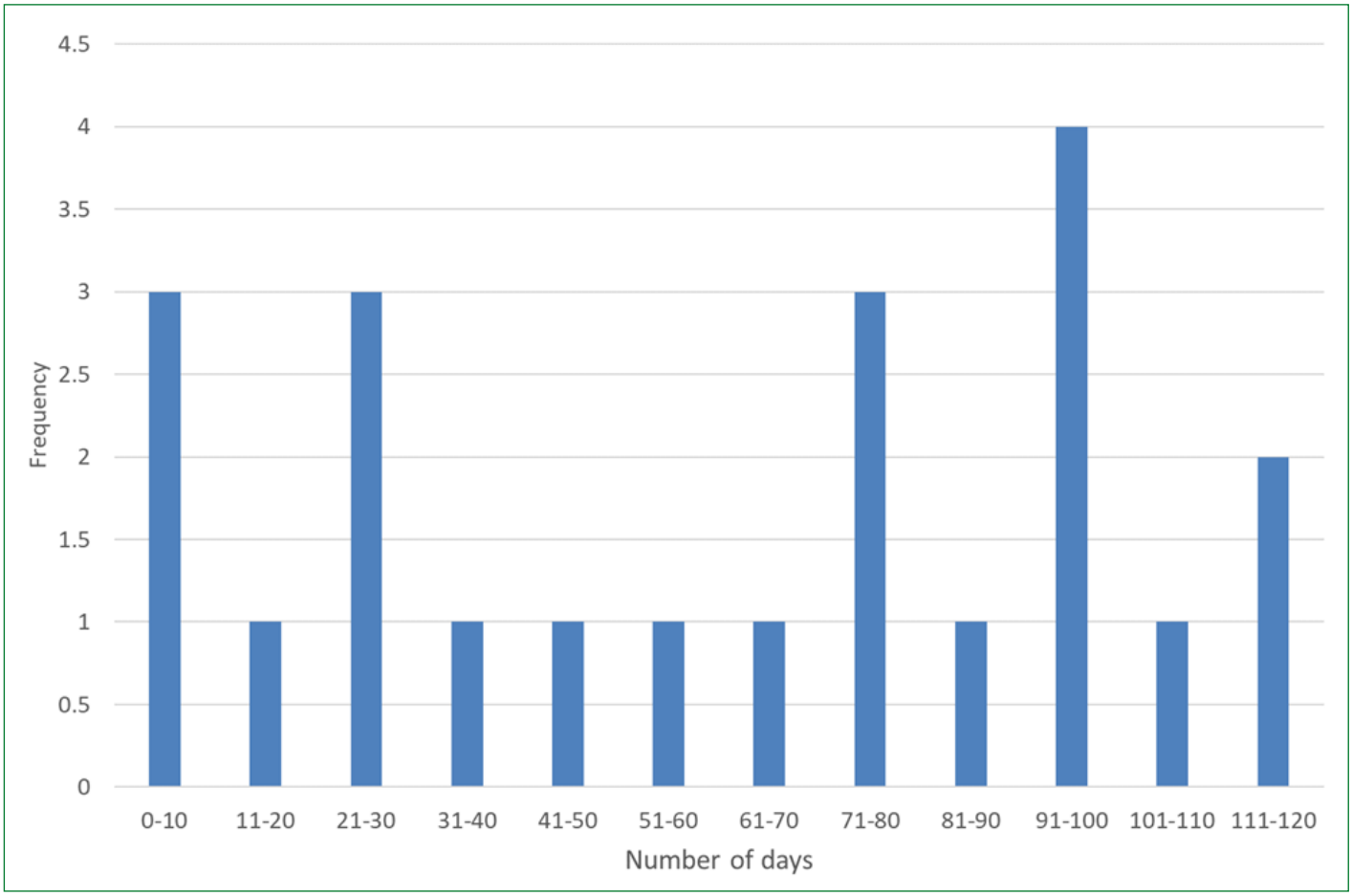


Figure 1. Frequency graph which shows the number of fish caught after tagging for ten day intervals.

The tagged Salmon caught on the Leithen Water.

Adult Salmon : How many are caught more than once?

The most interesting ancillary information that we can collect is by adding a PIT tag to each floy tag, which can be detected for fish that ascend the Gala Water where there are two detection antennae.

The Pit tag is attached to the floy tag with shrink wrap.

Two floy tagged fish with PIT tags have been detected in the Gala Water. The first fish was tagged at Middle Pavillion on the 16th October and detected on the 29th October at the fish counter. The second fish was tagged on the 6th April at Upper Dryburgh and detected on the 11th May. As a Spring Salmon, a detection on the Gala Water was unexpected as this tributary is not known for producing Springers, but this fish may have just been exploring the Gala Water before dropping back down to the main river.

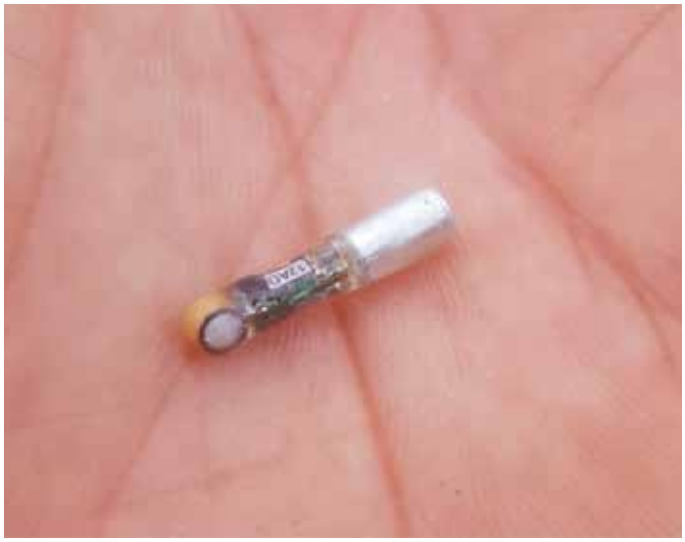
Salmon : Smolt Tracking Project

Rationale: *The Salmon smolt is the final product of the river. Losses at this stage of the life cycle cannot be replaced. It is therefore essential to know exactly where, how and when smolts are lost on their way downstream as it may be possible to reduce these losses, which is not possible to do at sea.*

After two years of tracking Salmon smolts in 2019 and 2020, with losses of 60% and 57.5% recorded respectively in each year, tracking in 2021 was to be funded through the Maritime Fund, working in partnership with Marine Scotland Science (lead coordinator) and three other Scottish rivers. In the previous studies we used a standard 5 mm sized tag with fish either caught by electro-fishing as they were starting to turn silver or at the fish trap during the main smolt run. As discussed in the 2020 annual report, we have so far been unable to rule out the possibility of tag burden (the fish carrying a tag in their body cavity), surgical recovery or the timing of tagging influencing the survival of smolts down the river. The 2021 study was designed to investigate these possibilities, with the survival of tagged smolts compared between a new smaller 3 mm tag and the 5 mm tag that we have used in 2019 and 2020. We also investigated whether the timing of tagging affects survival by tagging a sample of presmolts in early March to compare to smolts tagged in April. In addition to the tag effect study, the primary aims of the overall project to estimate smolt survival and location of high losses continued to be investigated.

Under the cloud of Covid and the risk of not being able to complete the project, the funding was delayed until 2022. However, with the generous financial support of the Fallago Environment Fund and sponsors, we made the decision to replicate the study design and carry out the work ourselves in 2021. The results could then inform the funded work carried out in 2022.

The main change to the 2021 study was the use of smaller 3 mm JSAT pin tags[4], a relatively new type of tag that is the smallest on the market. In the picture you can see the cylindrical silver battery (apparently designed for hearing aids) and at the other end the transducer which produces a sonic ping every ten seconds.



A close up picture of a JSAT pin tag.

To prolong the battery life the ping that individually identifies each fish is emitted at 417 khz rather than 180 khz which is used by our 5 mm tags; as the higher frequency is much shorter, battery life is improved. The 'cost' however is that large amounts of false readings are also recorded by the tracking receivers and have to be filtered out, making data analysis more time consuming. The 'benefit' is that a smaller incision is needed without a suture and the tag burden (weight of tag relative to fish) is reduced. Remarkably, tags can be set to operate from early March through to June without running out, allowing us to tag presmolts that will have time to recover from the surgical process before migration.

Catching presmolts in early March is not a straightforward task as it requires low water for safe electro-fishing and a lot of water has to be covered to find fish that are large enough for tagging. In winter, fish are much less active and are more difficult to extract from their hiding places under rocks; runs and riffles that are often full of fish in Summer and mostly empty in Winter, with most fish caught in slower water with large substrate. Even with these challenges, we managed to tag 78 presmolts with pin tags on the 8th and 9th March. 82 smolts were then tagged with pin tags at the trap in late April and 60 fish with the larger 5 mm tags.

The river conditions for the smolt migration period in 2021 were very different to the low water conditions in the two previous years. There was no rainfall throughout April 2021, which was similar, but on the 3rd May there was a moderate sized spate which took most tagged smolts out of the Gala Water and down to the lower river in a very short

[4] https://www.lotek.com/products/jsats-pintag/

space of time. The average transit time from Galafoot to Berwick in 2021 was 2.9 days for fish tagged with 5mm tags (maximum 8.2, minimum 1.0), compared to 16 days in 2020 and 22 days in 2019. The average transit time for fish caught at the trap with the smaller JSAT tag was also 2.9 days. Fish tagged as presmolts took on average, 7.1 days to reach Berwick; presumably this was slightly longer as some of these fish entered the main river before the spate in early May. Smolt number 35 was the fastest fish, reaching Berwick Harbour in 1 day and 9 minutes.

The migration period for tagged fish out of Berwick harbour was from the 5th to the 12th May, with the average detection date being the 6th May. In 2020, the average date was the 17th May (minimum 28th April, maximum 26th May) and in 2019 it was the 11th May (minimum 13th April, maximum 1st June).

The fastest smolt, about to be tagged.

Smolt Survival to the Sea in the Main River (Aim 1)

Thirty nine of the 60 fish tagged with Vemco tags were detected at Galafoot in 2021, 31 of which were detected at Berwick, producing a 20.5% smolt loss figure compared to 57.4% in 2020 and 59% in 2019. The overall percentage loss for JSAT tags (presmolts and smolts caught at the trap) was even lower, with 11% smolt loss to Ladykirk, the last station before Berwick. Data from the estuary receivers was not included due to a marked drop off in detections which is probably related to reduced detection range of JSAT tags in salt water which operate at a higher frequency than the Vemco tags. Splitting the JSAT data up into presmolts and smolts provides an interesting comparison; only 4% of smolts tagged at the trap and detected at Galafoot were lost on their way to Ladykirk (2 out of 52), compared to 19% for presmolts (12 out of 47). All of the presmolt losses were for fish that started their migration in March or April, rather than in early May.

The adult Brown Trout that consumed the tagged fish, with a mixture of Trout and Salmon smolts in its stomach.

While we are normally unable to determine what causes the disappearance of a tagged fish, by chance we do know the fate of one fish that was tagged with a Vemco tag on the 29th April at the smolt trap; this fish was not detected beyond Middle Pavillion as the tag was found in the stomach of a large Brown Trout that was killed by a Salmon angler. Large Trout in the past were aptly referred to as 'swallow-smolts'. Examining the tracking data shows that the tagged fish migrated into this area around 24 hours before the adult Trout was caught. A very interesting result which highlights the complexities of understanding smolt losses and the difficulties in improving their in-river survival.

Distribution of Smolt Losses in the Main River (Aim 2)

Results can be plotted as percentage survival against distance down the river to compare between different years.

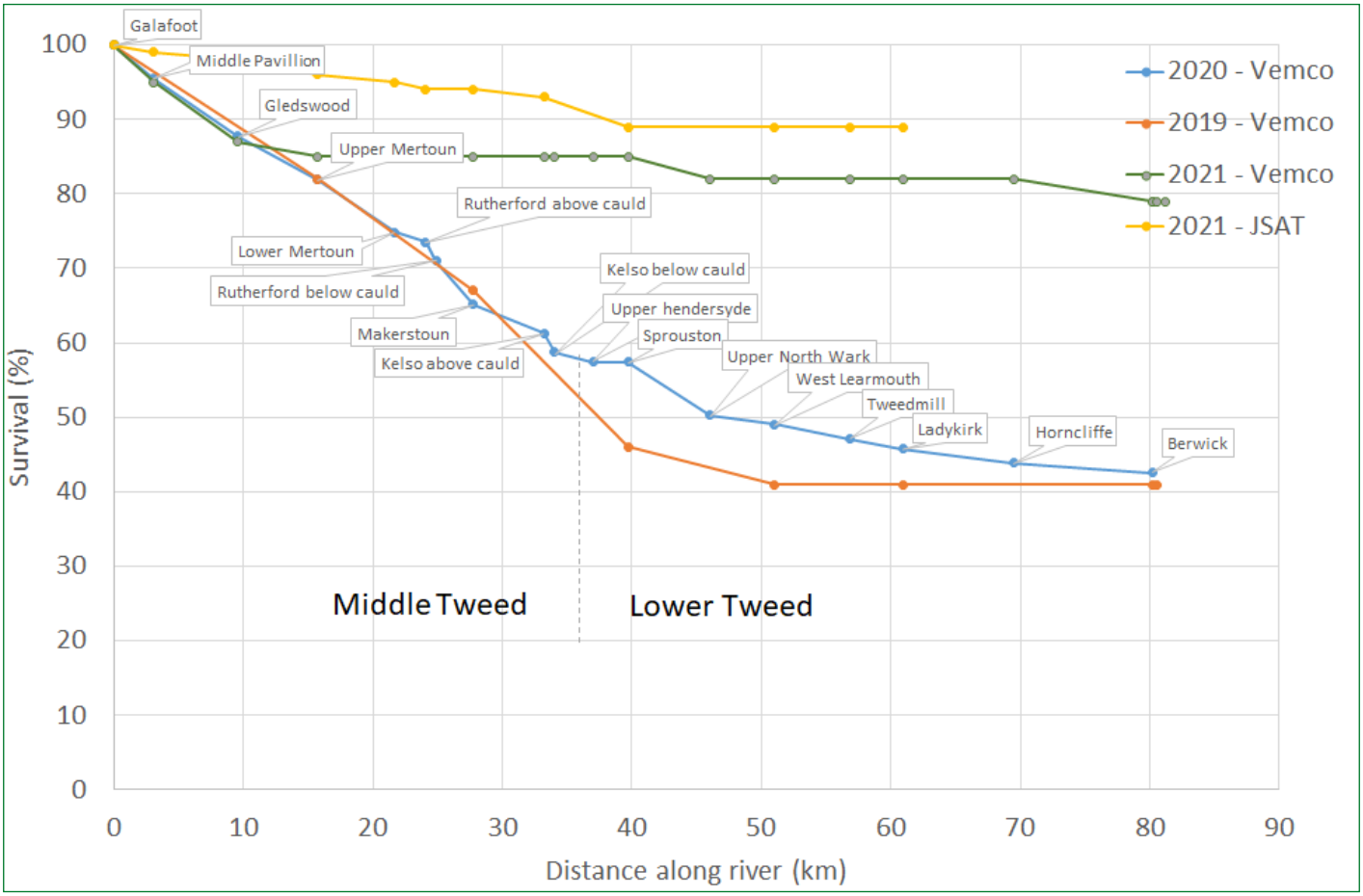


Figure 1. Smolt survival plotted against distance down the river from Galafoot.

In contrast to 2019 and 2020 when there were high loss rates in the Middle Tweed relative to the Lower Tweed[5], the rate of loss from Galafoot down to Sprouston for both types of tag was much lower in 2021, particularly for fish with the smaller JSAT tag. 45% and 57% of fish disappeared in this section in 2019 and 2020 respectively, compared to 18% for vemco tags and 11% for JSAT tags in 2021. There were almost no losses of tagged fish in the Lower Tweed in 2021, which was similar to the results of 2019 and 2020.

For a more insightful analysis to account for the varying distances between receivers, the results for 2020 and 2021[6] can be displayed as percentage loss per kilometre for the section upstream of each receiver for Vemco tags (Figure 2). The first point that this graph shows is that the percentage loss per km between receivers at the top and bottom of Rutherford and Kelso caulds[7] in 2020 was much higher than other sections of river. The graph also illustrates that percentage losses per km were similar in 2020 and 2021 for the first two sections (Middle Pavillion and Gledswood), although the sample size for 2021 was much smaller and the percentage loss was due to the disappearance of only two fish, which could be just a chance occurrence.

5 Lower Tweed starts just below the cauld at Kelso.

6 2019 data is excluded as there were a smaller number of receivers. Locations in 2020 and 2021 were almost identical. JSAT results are not included due to a slightly different distribution of receivers.

7 Distance between receivers. Rutherford Cauld - 790 m, Kelso Cauld - 820 m.

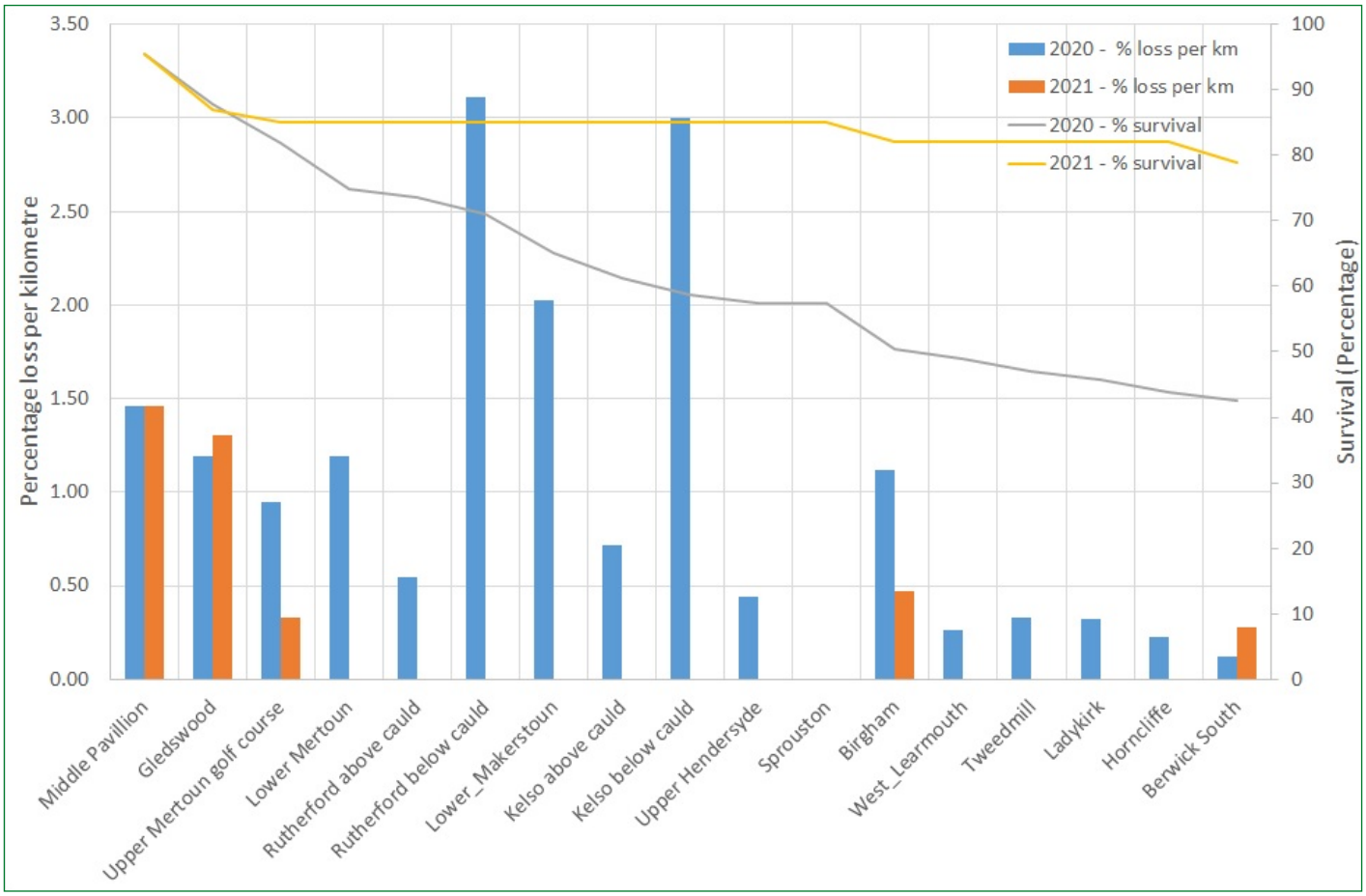


Figure 2. Percentage loss at each section.

Smolt Survival in the Lower Gala Water

Results for fish caught at the trap in 2021 were again very similar to previous years, with 35% losses for both types of tag in a 3 km section of river. Of potentially greater significance, losses in this section for tagged presmolts were 19% lower than for fish tagged at the trap[8]. It would be easy to conclude that this is the first evidence that the timing of tagging is affecting survival during the smolt run but further analysis that considers the influence of the rise in water in early May presents a different picture. By splitting presmolt detections at the first receiver into two groups; March-April and May, percentage losses can be compared between a period of low water and high water migration[9]. All of the fish detected at the upper receiver at the fish trap in May were detected at Galafoot, with all of these fish moving through this section on the 3rd and 4th May in high water. For fish detected in the March-April period, 16 fish were detected at the top receiver and 12 were detected at Galafoot, potentially producing a 25% loss in this section. However, two of the four fish may have been missed at Galafoot in early March when the detection receivers were not installed properly. Further analysis is needed to account for receiver detection efficiency and we need to be careful in drawing conclusions from such a small sample size.

Using the percentage loss figure per km, the Lower Gala figures for fish tagged at the trap continued to be between eight and ten times higher than the Middle Tweed.

8 47 presmolts were detected at the first receiver on the Gala Water at the fish counter and 43 were detected leaving the Gala Water (91%).

9 Analysis was limited to 37 out of the 47 presmolts as ten of these fish were detected at the Galafoot receiver, but were missed by the fish trap receiver (the JSAT receivers are not 100% efficient in detecting tags).

What do the Results Mean?

Smolt Survival to the Sea in the Main River (Aim 1)

Based on data collected at the Gala smolt trap, we know that in 2018 the cold Spring conditions associated with 'the beast from the east' and low water delayed smolt migration to early May, with very few fish movements in April. According to the Met Office, 2021 April temperatures were 0.7c below average and lower than March, which again is likely to have delayed the migration of Smolts. In 2018, the rapid rise in water temperature in early May triggered an abrupt start to the smolt run; in 2021 it was the rise in water.

It is logical to expect transition time from the Gala Water to Berwick to be shorter in high water than in low water years as smolts taking advantage of higher water levels will need to expend less energy reaching the sea, potentially saving their energy reserves for their marine migration. What is perhaps surprising is that there was no evident delay in the estuary or tidal area as smolts prepared to transition to salt water or waited for the optimum migration window. There is discussion in the literature regarding the importance of migration timing to the marine environment for maximising survival by coinciding with maximum food availability. It is very difficult to study whether migration timing influences survival as any study will rely on passive tags (without a battery) that can be detected for all of the fish that return to the natal river. The main point is that there is no evidence that Tweed smolts are actively choosing a specific time in Spring to leave the river.

The fast transition time in 2021 from Galafoot to Berwick (2.9 days) linked to the rise in water is the likely reason for the high survival of tagged smolts, although the processes leading to higher survival remain open to debate. It can be reasoned that there is an 'attrition rate' of losses per day through smolt consumption by a predator, natural mortality and there remain question marks over the influence of tagging and tag burden, all of which are likely to be geographically dependent. If this is the case, then the shorter the time period in the main river, the higher the survival rate will be. Added to this, it can be speculated that coloured, high water will make it harder for predators to catch smolts.

However, there still remains the question of whether the timing of tagging and tag burden affects smolt survival; the high water in early May could simply be masking the potentially detrimental effects of carrying tags and tagging. To definitively answer this question, low flow in the main river is required through the Spring period with the same tagging design as 2021, ideally with a larger sample size.

To provide some context regarding potential predation for Goosanders and Cormorants, bird counts between Ettrick Mouth and Berwick show that there were barely any Cormorants counted in April and May and Goosander numbers were below average, particularly for May with a count of 37 birds, the lowest on record. While we believe the primary factor for good survival in 2021 was high water, even if there were above average numbers of piscivorous birds, it is difficult to believe that they could have had a significant effect on smolt survival when the average transit time was 2.9 days. In the 2019 report, a simple analysis of potential damage to the total smolt run was carried out based on the size of the bird population and consumption rates per day over a two month period, which suggested at most, 5-10% of the Salmon smolt population could be consumed. With the migration window in 2021 for most smolts confined to a short window of a few days, combined with high flows making feeding difficult, bird predation is likely to have been negligible.

The implication from this study is that if the level of survival in years with high water in the smolt migration window is double the survival of smolts in low water years, then there would be a detectable relationship between flow conditions in the smolt run and returns of adults in the two subsequent years. While we have not carried out this specific analysis (as yet), there is no mention of such a relationship in the scientific literature. Tagging or tag burden could be a primary factor influencing survival in the main river in low water conditions, but is disguised when there is a rise in water in the smolt migration window and therefore it remains a conceivable theory.

Distribution of Smolt Losses in the Main River (Aim 2)

The pattern of higher losses in the Middle Tweed relative to the Lower Tweed was again found in 2021, although the size of the losses was much smaller, mainly because overall survival was much higher in 2021. Following the same reasoning for assessing overall survival, the short time period spent in the Middle Tweed for most fish would mean that the 'probability of loss' based on attrition rate per day would be less.

Smolt Losses in the Lower Gala Water

The 2020 report gives consideration to the potential influence of predation as the main factor causing the high Gala Water losses. Based on the number of Goosanders and Otters that could be present, their consumption rate per day and the size of the smolt run estimated from the the trap, predation appears to be an unlikely factor. In the absence of any evidence for a natural or man-made factor affecting the survival of tagged smolts in the lower Gala Water, the possibility of tagged fish having a greater susceptibility to mortality (loss) compared to untagged fish, either through predation or disease, continues to be an ongoing concern.

There is no instance of such high losses in other studies that we know of for what appears to be a healthy section of water without any issues that could cause high levels of mortality. One difference that needs to be looked at is the location of tagging; on the Dee and Deveron, tagging has taken place in less productive upland areas. It can be speculated that there are less predators in these areas or the bacterial load in the water is at a lower level, helping tag incisions to heal.

The inherent challenge of determining the fate of smolts that disappear in the lower Gala Water remains. Ideally, manual tracking would allow us to pinpoint the locations of tagged fish on a daily basis after tagging to record their progress down the river. However, detections can only made in quieter, slow flowing water, therefore potentially missing out areas of faster water. The use of radio tags is a possibility as they can be detected in noisy water, but this would require investment or the hiring of different tracking equipment which is more expensive and unlikely to be utilisable in the main river with the same receiver number as for the Vemco acoustic tags.

Conclusions

- The 2021 study shows that the rise in water levels in early May, combined with below average temperatures in April were the primary environmental factors influencing migration timing, transit time from Galafoot to Berwick and ultimately, the high survival of tagged Salmon.
- Results from the Gala smolt trap combined with the tracking results provide an important insight into the movement of Tweed smolts in relation to temperature and water flow; in particular, that cold, dry springs lead to minimal movement of smolts from tributaries like the Gala Water into the main river, which has important implications for the strategy for understanding and managing piscivorous bird predation.
- The 2021 study produced contrasting results to the two previous years. On the one hand, this provided a useful insight into smolt survival under different flow conditions; on the other, the rise in water in early May masked any potential differences in survival due to the timing of tagging or the size of tags in the main river.
- The 2021 study design to investigate the effect of tag size and the timing of tagging is to be repeated in 2022. Our ability to detect differences will depend on low flow conditions early on in the year to capture presmolts in February to March and in the main migration window during the smolt run.

Bird Predation

While our regular monitoring of the Tweed Goosander and Cormorant populations is carried out annually, we continue to try and develop our knowledge base on their potential damage to the fishery. The dietary analysis work commissioned by Marine Scotland Science has been extremely protracted and ultimately may not provide the resolution of results that we are looking for. We are currently remedying this issue by developing our own ability to process birds shot under licence for dietary analysis.

Another small step forward was the tagging of six Goosanders with a tag that allows birds to be tracked using the phone network. The work was undertaken through funding from Scottish Government as a joint contract between The Tweed Foundation, British Trust for Ornithology, Game and Wildlife Conservation Trust and Centre for Ecology and Hydrology. At the time of writing, the report has not been released, so unfortunately we are unable to present any of the results.

Fry and Parr : Where and How Many?

Rationale: *The juvenile Salmon and Trout of the Tweed catchment have been systematically monitored by electric-fishing since 1988, providing a long series of records that can show any trends or sudden changes as well as natural variability.*

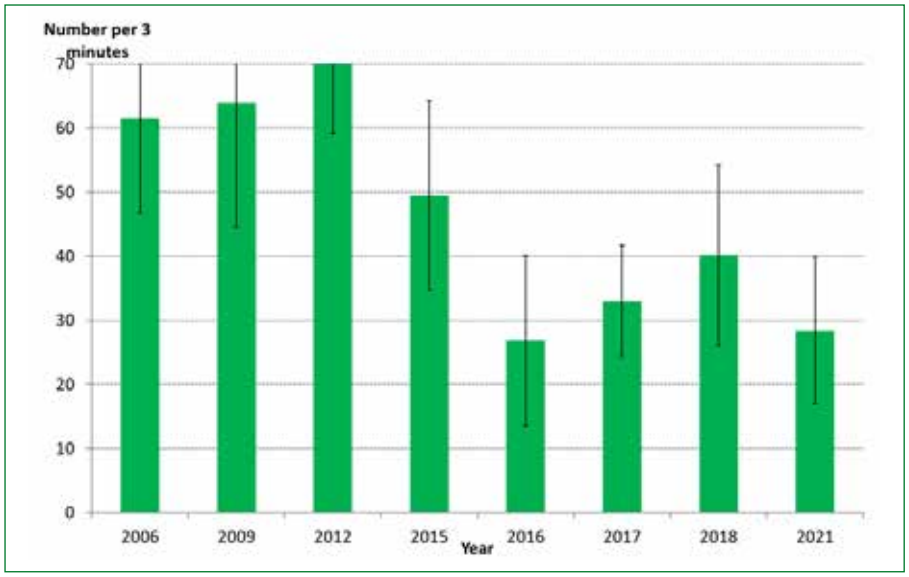
While our annual electro-fishing for juvenile Salmon and Trout is primarily to monitor numbers, it is also our 'eyes and ears' for understanding our catchment, in particular the relationship between environmental and human factors and local fish populations. Electro-fishing continues to provide a vital insight into how juvenile Salmon stocks are performing against the backdrop of decreased numbers of returning adult Salmon. An understated benefit of electro-fishing is that it provides an opportunity to meet many landowners and often surprise them when the probe is turned on to reveal large numbers of fish that are hidden away under rocks and overhanging vegetation.

In 2021 we focussed on the Leader, Gala and Upper Tweed as part of our triennial monitoring programme. The full online report can be found at **https://arcg.is/1TmDv40**, which includes a link to the electro-fishing methodology. Within the online report, there are maps that display site specific results, but of primary consideration for Salmon is calculating the average number of Salmon fry and how results for 2021 compare to previous years. For main channel sites for the three catchments[10], average numbers of Salmon fry are displayed in the graphs on the following page. It is immediately obvious from the areas that there are stable numbers of Salmon fry in the Gala and Upper Tweed. A decrease in numbers was detected for the Upper Tweed in 2016 which we attribute to the winter floods but this decrease was not detected on the Leader and Gala Water. A decrease in numbers is evident for the Leader Water; while the error bars indicate the range of values that could be the correct average for the population, there appears to be a drop in the average numbers of Salmon fry after 2015, which we do not have an explanation for. A lack of spawning fish is a possibility but in 2020 there was a good return of adult Salmon returning to the Tweed, which was reflected by a record count through the fish counter on the neighbouring tributary, the Gala Water. While neighbouring tributaries do not necessarily act in the same way, reasonable numbers of fish would still be expected to spawn in the Leader Water. While there has been a recorded decrease in fry numbers in the Leader catchment after 2015, it is important to note that the average number of around 30 fry per three minutes since 2016 is very similar to the Gala Water and Upper Tweed.

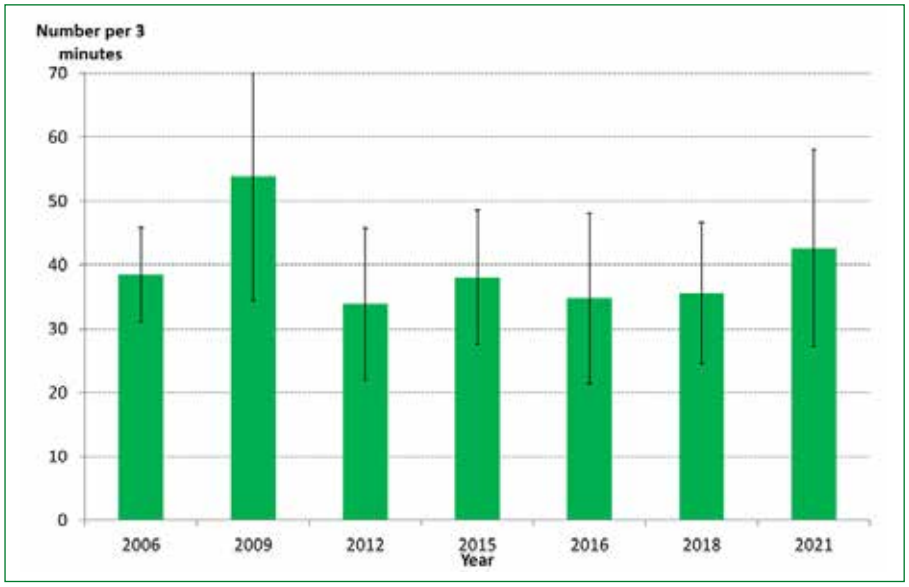
Important context to interpreting the Salmon fry numbers is having an accurate estimate of number of adult Salmon that spawned in a particular catchment. For the Gala Water, we have the fish counter in operation since 2008, which estimates number of adult Salmon and the total amount of deposited eggs (total and eggs per 100 m^2). Of particular note, there was a record number of Salmon that spawned in 2020, with an estimated 2,478 adult fish through the counter. Even though the 2020 adult total was two or three times the totals in 2014 and 2017, no corresponding relationship with fry numbers can be detected. This provides good evidence that the run-riffle areas that are sampled are at capacity. What we do not know at present is how fry behave in years when there is high levels of spawning, such as 2020; a reasonable theory that needs exploring is when there is elevated levels of competition, fry move into other less productive habitats, in particular glides and pools. In these areas, fry could be more susceptible to predation and grow less quickly due to poorer feeding. As mentioned in the section on the Gala Water, the annual electro-fishing now carried out on this catchment using the method developed for the National Electro-fishing Programme Scotland is non-habitat selective, which will provide new insights into the dynamics of Salmon fry and parr populations.

[10] Site in smaller watercourses less than 5 metres width are excluded as water flow the previous Autumn becomes increasing influential for fish access, leading to variable results that are less influenced by adult numbers.

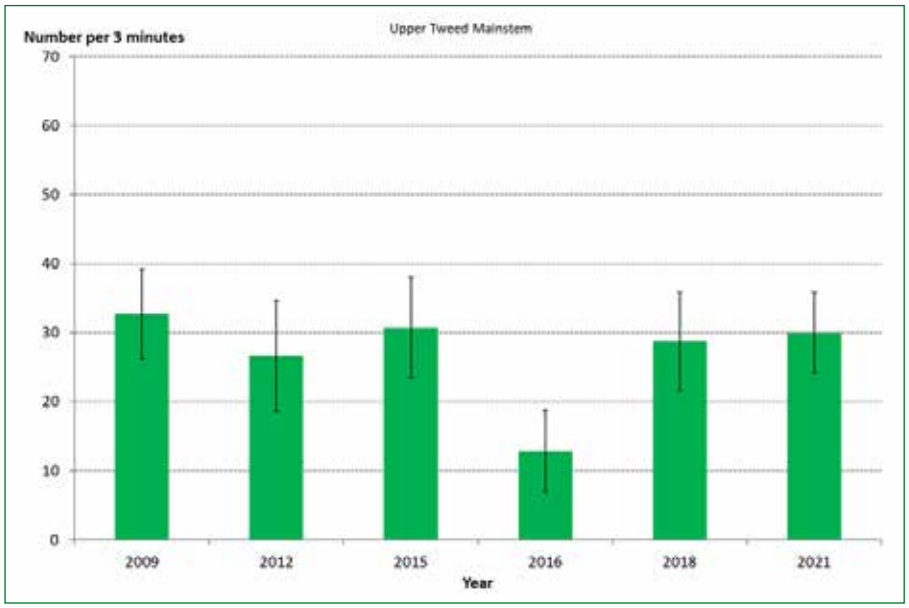
Leader



Gala



Upper Tweed



National Electro-fishing Programme Scotland (NEPS)

The team electro-fishing a site on the Ale Water.

In 2018, 2019 and 2021, The Tweed Foundation has participated in the NEPS project[11] which involves Trusts and Boards in all catchments with Salmon in Scotland electro-fishing a panel of 30 electro-fishing sites for local and national assessment purposes. The NEPS programme is a product of considerable efforts made by scientists from Marine Scotland to develop statistically robust methods that allow meaningful comparison between rivers and provides a benchmarking system that predicts results for a healthy population for any site or catchment in Scotland.

At the time of writing, the 2021 results are not available, but should be produced imminently. Since the numbers of fry counted in 2021 will be produced on the good run of adult Salmon in 2020, it will be interesting to see whether the Tweed results reach the benchmark that is set for it. For the 2019 results, the model determined that the Tweed did not meet the benchmark, in contrast to the adult assessment method which categorises Tweed as a category 1 river, meaning it should be reaching its spawning targets with a high degree of certainty. At present the model struggles to deal with parr results relative to the benchmark, as we know from the ageing of fish using scales from smolts and adults that over half of Tweed Salmon leave the river after one year, therefore meaning that they are effectively absent from the river when sampling.

Going forward, the hope is that NEPS will be carried out annually, but this will require ring-fenced funding and dedicated Marine Scotland Science time to make sure this happens. The most likely avenue for this to happen is to make it an implicit requirement of the Wild Salmon Strategy which is currently under development. Without funding, the 2022 programme will not take place.

[11] More information can be found at https://www.gov.scot/publications/national-electrofishing-programme-for-scotland/

Adult Salmon : Fish Counters

Rationale: *The most basic need for the management of a stock is that enough fish should escape all the pressures on them to spawn and fully stock their nursery areas with enough eggs for the next generation. The best way to investigate the health of each fish stock is to accurately count the returning adults of each species. Fish counters are run on the Ettrick, Gala, and Whiteadder, providing information on run timing, size, and numbers for Salmon and Trout.*

Ettrick

The Salmon total (Figure 1) for the Ettrick counter was 2,693 fish; although marginally less than the total of 2020 (2,841), this is still much higher than the totals of 2018 (1,216) and 2019 (1,533), but 800 less than the average totals before 2010. Given the poor catches on the river in 2021, the total was higher than many people would have expected.

The summer of 2021 was very dry and so when there was a large amount of rainfall in the first week of October, a large proportion of the fish moved up through the counter. After such a dry period the increase in water flow came with very turbid water, which makes identifying fish species very difficult. Fish that cannot be identified from a video clip are later identified using a predictive model[12] based on the length of the fish and the associated probability of being a Salmon or Trout.

Cleaning the counter in September.

Using the total number of adult fish spawning above the Ettrick, we can calculate an estimate for egg deposition. For 2021, the estimate is 12,580,758. Although this total is slightly less than 2020, it is still more than double the deposition estimates for 2018 and 2019 and the reference values[13] of 250 and 500 eggs per 100m^2. Unfortunately we were unable to carry out electro-fishing monitoring on the Ettrick in 2021 but we will carry out repeat monitoring in 2022.

For Trout totals shown in Figure 2, we look at two size classes; under 40 cm in length (Brown Trout) and over 40 cm in length (Sea Trout and a small proportion of large Brown Trout). This year to speed up the validation procedures we increased the threshold filter to 40 cm to remove a large amount of false counts from turbulence events and debris. This procedure had to be done on almost all files for 2021 and so unfortunately it filtered out Trout under 40 cm. However, we can compare the numbers of Trout greater than 40cm; in 2021, 1,229 Trout over 40cm passed through the counter, which is still below the average of 1,717 prior to 2017 but is greater than the total of 2020 and almost twice the total of 2018. We will be able to continue investigating the health of the population of juvenile Trout in the Ettrick during our electro-fishing monitoring in 2022.

12 More information on how our fish counters operate can be found at www.youtube.com/watch?v=l8o2Hqu5lwA link

13 Discussed in the 2020 annual report under the section 'egg deposition rates'.

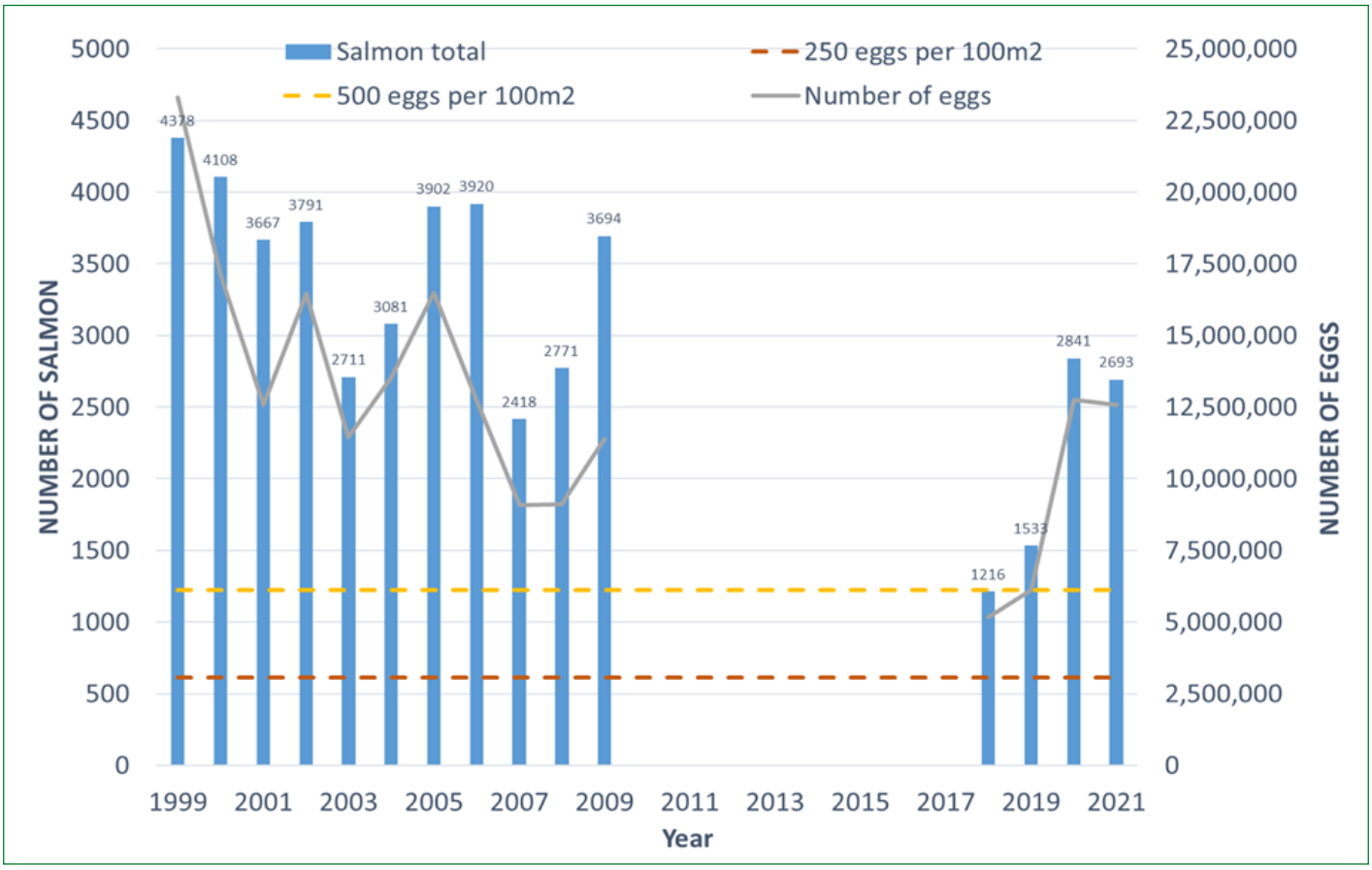


Figure 1. Ettrick Salmon totals with estimated egg deposition.

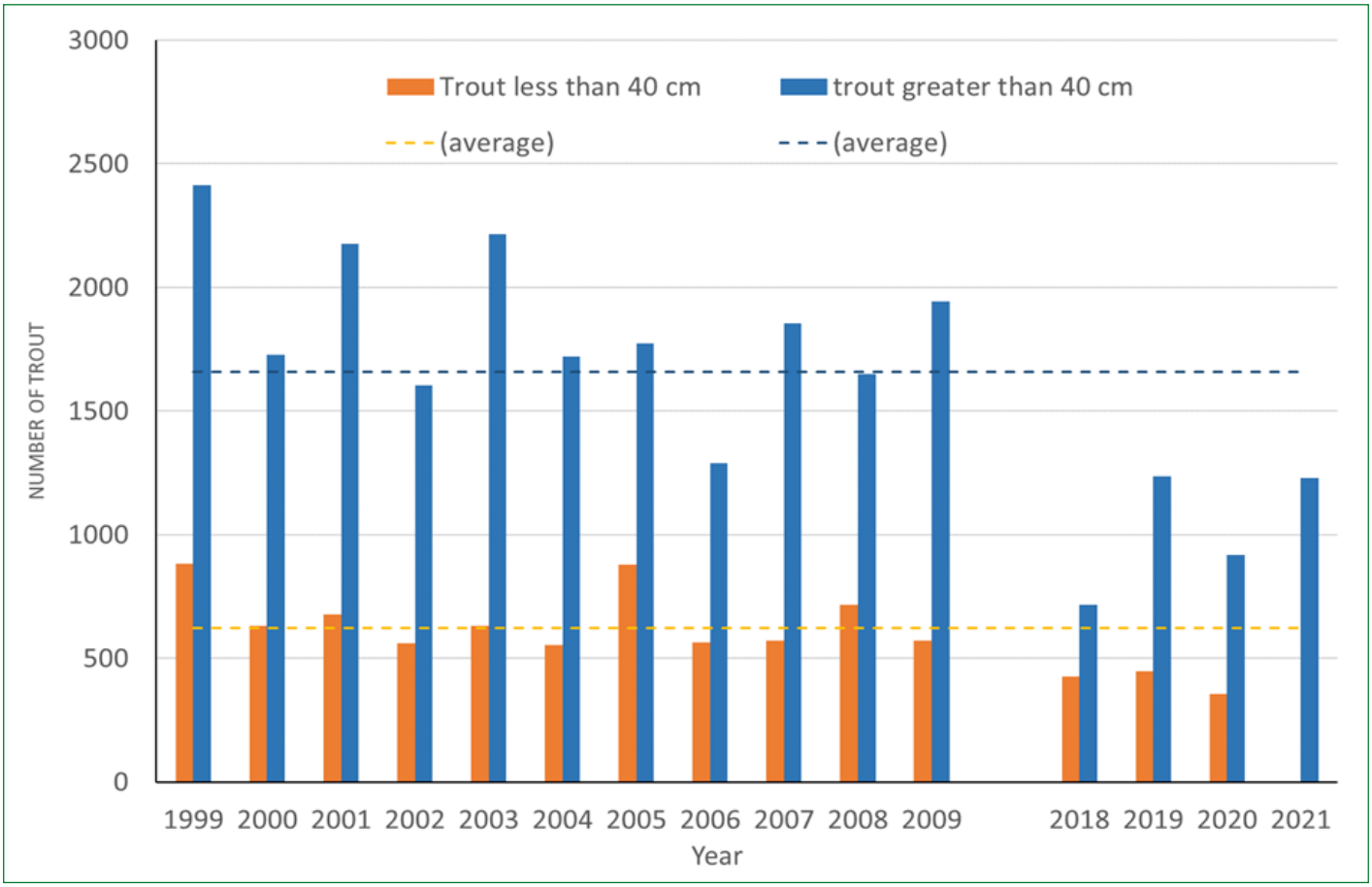


Figure 2. Ettrick Trout totals. Fish under 40 cm not included in 2021 due to a size filter that had to be applied.

Gala

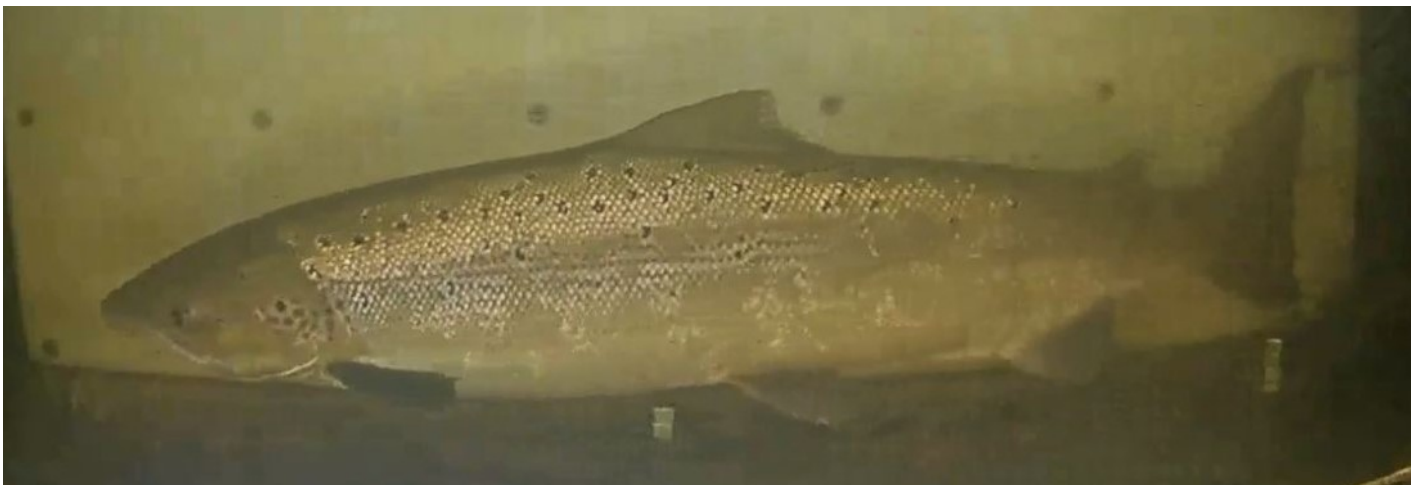
In contrast to the record count in 2020, 1,028 Salmon were counted passing through the Gala fish counter in 2021, the third lowest count on record, with only 2012 and 2019 having lower totals. The 2021 total was 365 less than the long term average. However, the estimated egg deposition for 2021 is 4,128,158 eggs, which is still substantially higher the reference values[14] of 250 and 500 eggs per 100m2 that are shown on the graph.

The average length of Gala Salmon in 2021 was 68 cm, which is slightly lower than the 73cm average for the Ettrick[15]. The average length of Ettrick Salmon may be higher due to a greater proportion of two and three sea winter Salmon relative to the Gala. Advancements in the genetics of Salmon will hopefully make it easier to investigate stock structure in the near future.

The Gala fish counter.

The upgrades made to the counter in 2020 (the same as the Whiteadder) are continuing to provide high quality video clips, making the process of identifying fish species faster and more reliable.

In 2021 we were also able to test having a PIT antenna attached to the Gala counter with the aim of getting video footage and a length recording of PIT tagged fish returning to the Gala Water. Despite encountering some teething problems with metalwork affecting the antenna functioning, we did detect some of the tagged fish in 2021, including the fish shown in the picture, which was tagged at the Gala trap in 2019. It was a 113 mm Smolt when tagged and after spending two years at sea, returned as an 85 cm adult Salmon.



A Salmon that was PIT tagged at the Gala trap in 2019.

As is the case for the Ettrick, we separate Trout counted into two size classes; under 40 cm in length (Brown Trout) and over 40 cm in length (Sea Trout and a small proportion of large Brown Trout). The total for Trout below 40 cm was 984 which is higher than in any other year for the Gala Water. There is no obvious explanation for what appears to be an upward trend in the number of Brown Trout returning to the Gala Water. The total number of Trout over 40 cm was 939, compared to a long term average of 1,286.

14 Further details on references points and egg deposition can be found in the 2020 annual report.

15 The average lengths of Salmon and the effect on egg deposition is presented in the 2020 report under the egg deposition rate section.

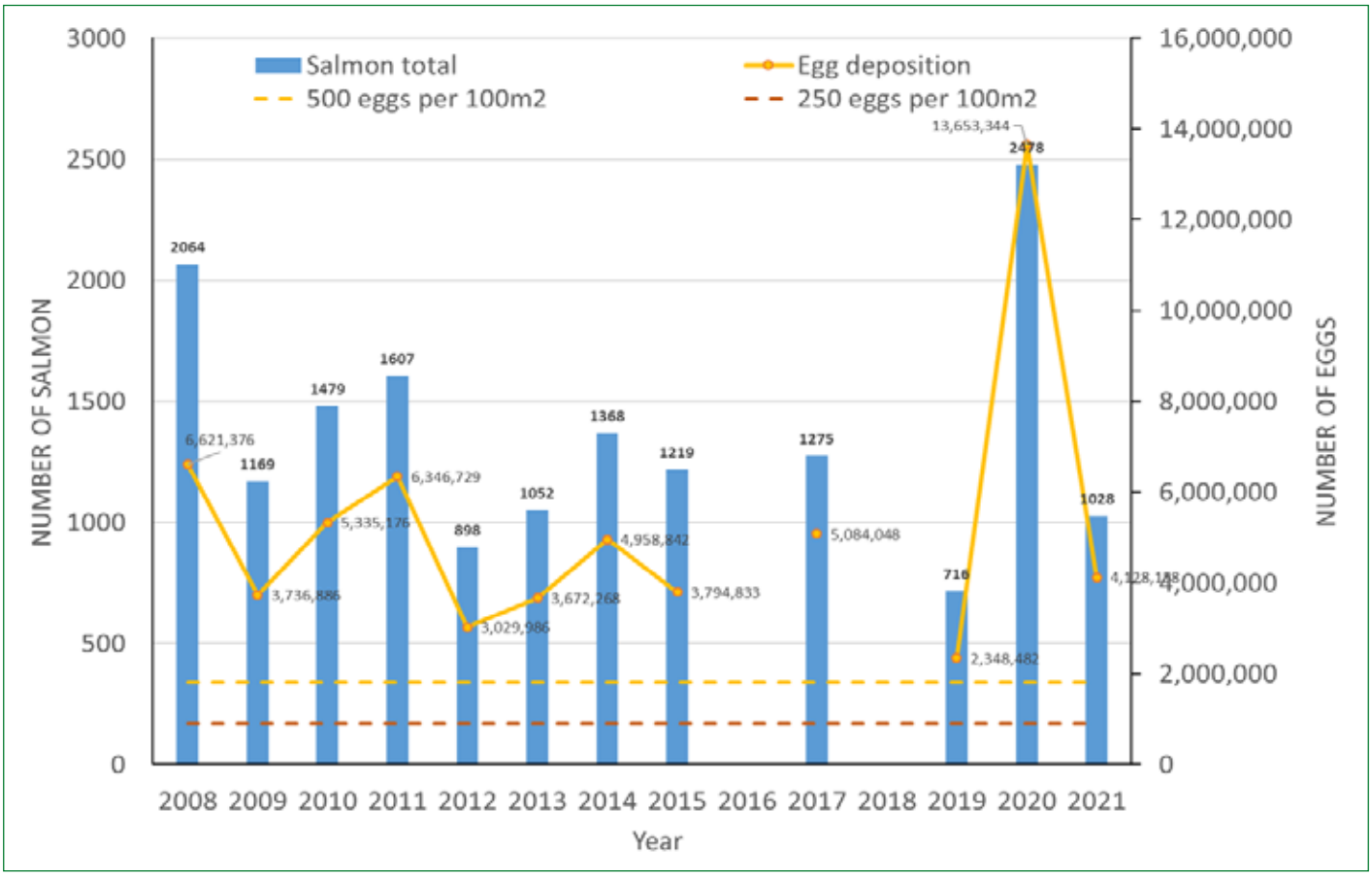


Figure 3. Salmon totals with estimated egg deposition.

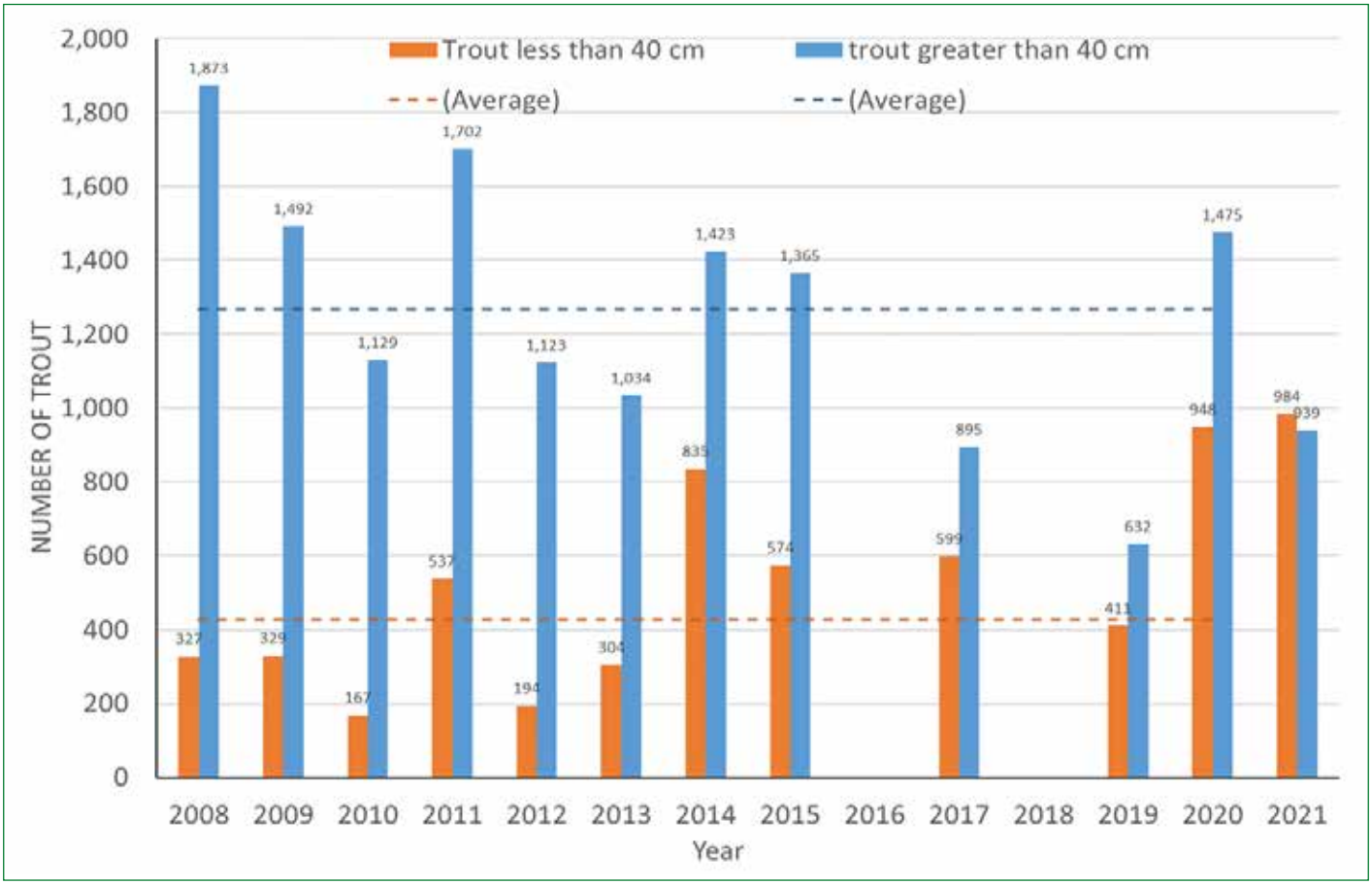


Figure 4. Annual totals for Trout under and over 40 cm.

Whiteadder

In 2021 a new light tunnel was installed, which is the stainless steel box which controls the position of the fish for video clips and houses the camera, lights and scanner. Of particular importance, the new light tunnel has a glass panel in front of the camera which creates more laminar flow, reducing turbulence in the scanner and with an air filled pocket, significantly improves the clarity of video clips for species identification. All three of the Tweed fish counters now have this hardware. Due to this work being carried out, the counter was not functioning for a month from the end of March and with debris blocking the counter after several spates, an accurate count cannot be made for 2021 due to missed fish[16]. The upgrades showed an immediate improvement in data and video quality; we are looking forward to 2022 with the counter in full operation again.

The Whiteadder counter.

Images from the Whiteadder counter

A feature of the Whiteadder counter is that being relatively close to the sea, Salmon that are recorded in the first part of the year are often very fresh, producing stunning video clips of silver fish.

One of the first Salmon recorded by the counter in April 2021.

In the Autumn, fish are typically coloured, having sat in the river downstream of the counter for as long as eight months.

Salmon running in October with a Trout Parr.

From June onwards, we start detecting very silver one sea winter Sea Trout that migrate up through the lower Whiteadder in low water, often undetected by anglers.

16 Previous totals can be found in the 2020 annual report.

The visibility of the water is still fairly good and the upgrades made to the counter make it easier to see the fish.

Salmon running in May.

Brown Trout are also recorded through the counter.

Brown Trout and Grayling : Catches

Rationale: *Monitoring the catches and fishing effort for a sample of anglers is the only way in which a reasonable indication of the state of the Brown Trout stocks and fishing can be produced at present. The recording of effort and methods that produce catches also means that they can be compared over time.*

The health and quality of any fishery can be measured by two metrics: the ease of catching fish, commonly referred to as the "Catch Rate" (number of fish caught over a given time) and their size. While size limits vary throughout the catchment, there is a general interpretation that that fish over 8-10 inches (20-25 cm) are 'oversized' or in the past 'takeable' and anything under 8-10 inches is undersized.

To measure the health of the fishery, the Tweed Trout and Grayling Initiative (TTGI) introduced catch log books in 2006 After the first three years of data collation, the Tweed Foundation offered advice that angling associations should either implement full catch and release or a slot size policy (only fish of a certain size range could be killed). The rationale for the advice was to help protect the breeding population of sexually mature Brown trout, helping to maximise spawning for the next generation of fish. Catch and release or slot limits will also increase the number and size of prized fish for anglers to catch. In 2009 most angling associations and clubs introduced a size slot limit, with Peeblesshire Fishing Association becoming a fully catch and release fishery.

13 years after the introduction of the policies there is an opportunity to reassess what effect, if any, these policies have had on the Brown trout and Grayling fishing. Is the fishing getting easier, are sizes of fish changing and where are the largest Trout? This assessment is only possible due to the efforts of the Tweed anglers that have submitted their catch logbooks over the 16 year period.

Catch Rates

The catches that anglers are reporting show that Brown trout fishing has fluctuated between years but has on average remained stable between 2006 and 2021. The catch rate for Grayling has improved over the same period (Figure 1). The fact that there is no trend in catches indicates that the trout fishery has a healthy recruitment and also that angling pressure is having no more than a limited effect on the Brown trout population. The increasing catch rates for Grayling could be due to anglers targeting them with more effective techniques or the Grayling population range and size has been increasing.

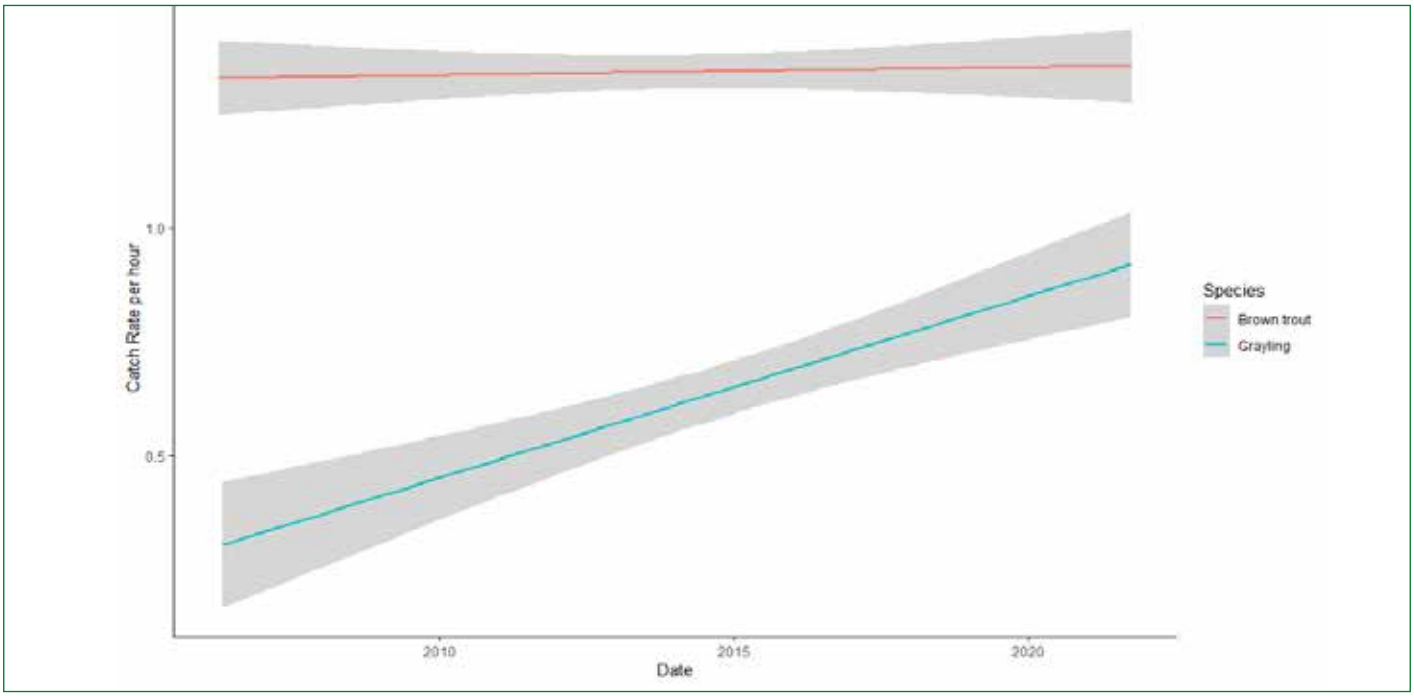


Figure 1. Catch rate per hour of all oversize and undersized Brown trout (red Line) and all oversize and undersized Grayling in (blue line). Grey areas around the line indicated our confidence in our results. Therefore, we are confident that the Brown trout fishing has remained stable while Grayling has been on the increase.

Sizes of Fish

Since 2009 it is clear that there is a greater number of larger Brown trout throughout the catchment. However, when viewed for different parts of the river, the story gets a little more complex. On the main stem of the Tweed, the Upper Tweed has shown a marked increase in size over the years, becoming one of the best fisheries for large Brown trout. The Lower and Middle Tweed have also shown an average increase but it has not been at the same rate as the Upper Tweed (Figure 2). What is unclear is to why there would be a difference in the rate of increase. One theory is that the catch and release policy implemented by Peeblesshire TFA has allowed Trout that would previously have been killed to reach a larger size and be caught in multiple years. As a smaller sized watercourse relative to the lower river, these larger fish may be easier to target and catch.

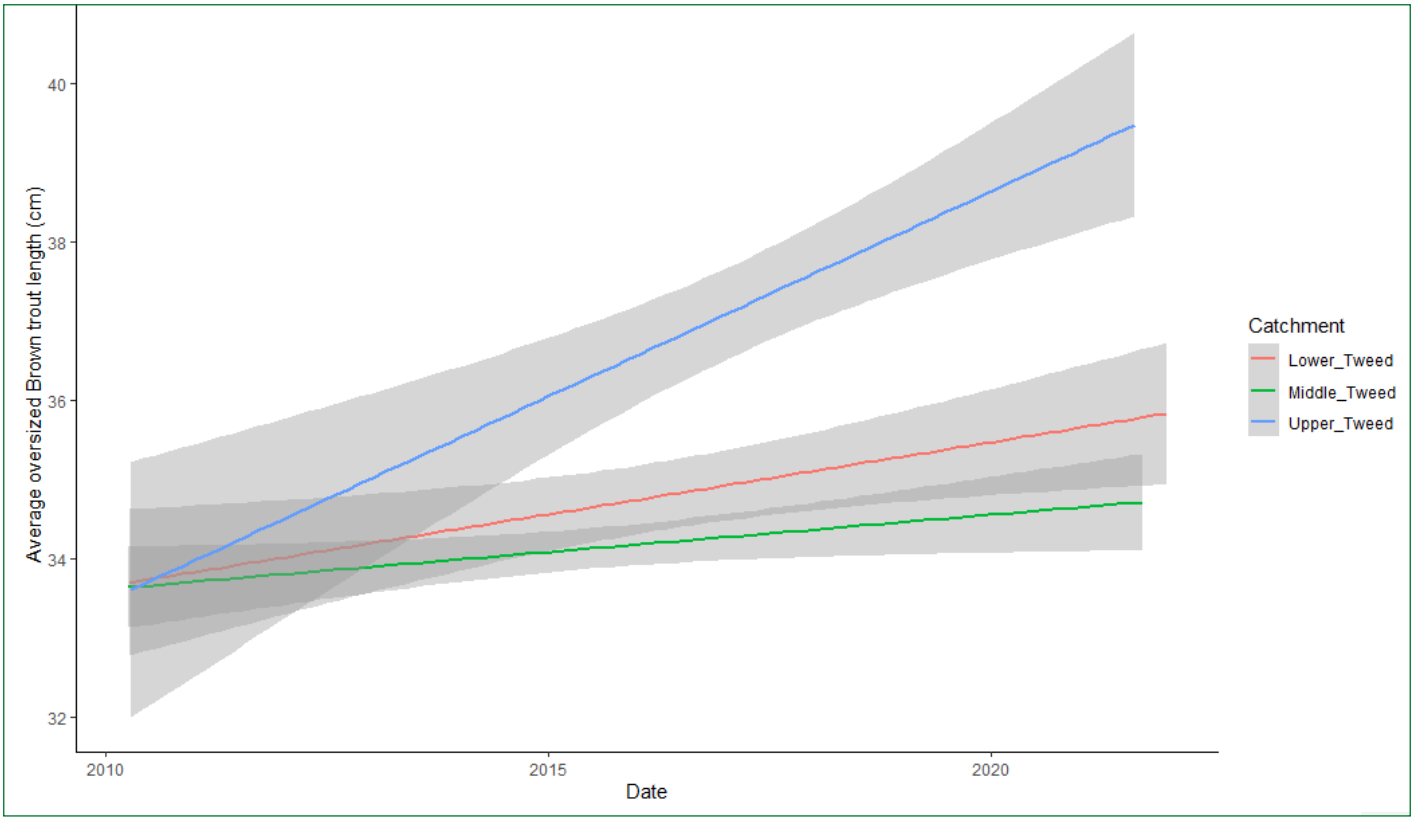


Figure 2. Average size of the oversized Brown trout 25cm (10"+) over time between the three major Catchments. Lower Tweed in red, Middle Tweed in green and Upper Tweed in Blue. Grey areas around the line indicated our confidence in our results. Therefore we are confident that the Brown trout size is increasing in the Upper Tweed, and less confident about Brown trout increasing in in size for the Middle and Lower Tweed.

A different picture to the main stem has been emerging on the tributaries. For example, it is possible that Brown trout of the Leader Water are decreasing in size but due to the lack of data it is hard to have any confidence. The Whiteadder and Blackadder, Ettrick and Yarrow and the Teviot have all seemed to have remained stable (Figure 3), suggesting that the fishing and environmental pressures have remained stable throughout this period.

Trout Size Distribution Within the Catchment

On average, the largest Brown trout are caught in the Upper Tweed, followed by the Lower Tweed, then the Middle Tweed. Unsurprisingly, the smallest fish are caught in the tributaries. The results are slightly surprising as we would expect the largest Trout to be caught in the Lower Tweed where growing conditions are expected to be at their best in he catchment. However, this is not reflected in the catch log books. It is likely that the Peeblesshire catch and release policy has an important role to play in the conservation of larger Trout.

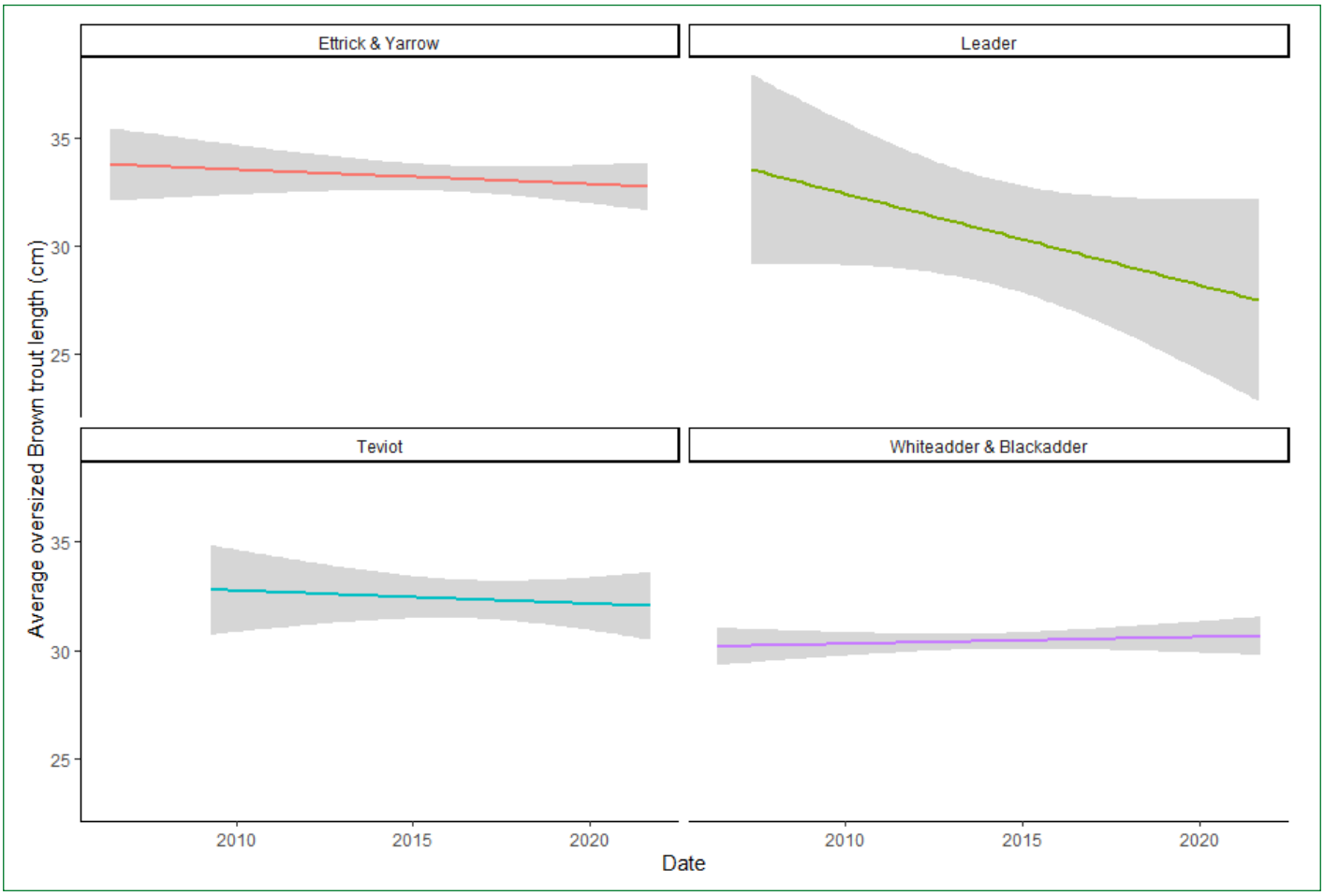


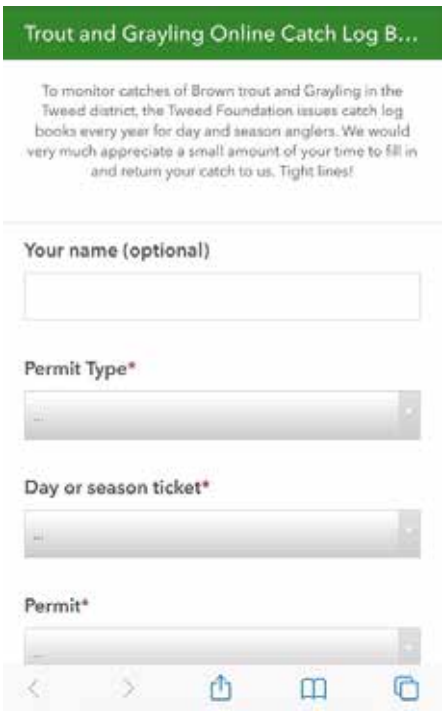
Figure 3. Average size of the oversized Brown trout 25cm (10"+) between the major tributaries. Ettrick and Yarrow in red, Leader in green and Teviot in Blue and Whiteadder and Blackadder in purple. Grey areas around the line indicated our confidence in our results. We are therefore confident that the Brown trout size is stable in the Whiteadder and Blackadder, Ettrick and Yarrow and Teviot. We are less confident about Brown trout decreasing in size for the Leader due to the small number of logbooks that we receive.

The Future of Logbooks

As illustrated above, the logbooks and the data they generate are vital to our understanding on how the fisheries are preforming and how management actions such as catch and release and slot size limits affect the size structure of Tweed Brown trout and Grayling populations.

However, there is a worrying decline in log book returns with the peak of returns in 2015, followed by a decline since then. At the time of writing we have handed out 1,000 logbooks for the 2022 fishing season. We have also introduced a new online catch log book where catches and photos can be submitted on the river bank at the end of your session rather than posting the book back at the end of the season (https://arcg.is/Sr0S4).

SCAN ME



Rationale: *With predictions for changes in rainfall, flow patterns and temperature due to climate change, it is important to try and forecast impacts on fish habitats so that any step to mitigate these changes can be identified.*

Biological implications of water temperature on Atlantic Salmon and Brown Trout

As fish such as Salmon and Brown trout are ectothermic (meaning that they derive their thermal energy from the surrounding environment), water temperature controls their metabolic rate and also respiration. This means water temperature control their growth rates and appetite. As our climate is warming, we are getting hotter and drier summers and warmer, wetter winters and this has implications for the health and survival of all Tweed fish species, not just Salmon and Trout.

Lethal Limits: The lethal limit for Atlantic Salmon changes on an individual and population level but it is reported to be somewhere between 23-30°C[17, 18, 19]. A report from the Environment Angency[18] highlights that water temperature persisting above 28°C for seven days can be lethal for resting Atlantic salmon. For Trout, the lethal level is 25°C. The effect of increasing water temperature is a corresponding decrease in dissolved oxygen content. When water temperature reaches or exceeds lethal limits, the dissolved oxygen content within the water reduces to a point where fish can no longer survive. A fishes body condition can also determine how much a fish is affected by heat stress as individuals with greater body condition can cope with the lethal heat better than those that are skinnier[19]. However, an increase in water temperature does not always have lethal effects; Salmon and Trout can be affected from ova to adults in more subtle ways.

Other effects of temperature on salmonids: An increase in average water temperature has been shown to lead to smaller adult fish because they reach sexual maturity sooner and consequently put more energy into reproduction than their growth[20]. It can also lead to a smaller number of eggs but at a larger size[20]. Smolts increase their developmental rates and activity during the day[21] and change the timing of their migration out to sea[21]. There is also evidence to show that parr will move into thermal refuges to escape the high temperatures in streams, increasing their density and thus competition. It's possible if parr drop downstream and pass barriers such as weirs and culverts to avoid this increased temperature, when the temperature cools again, the parr may be unable to migrate back up stream, potentially increasing localised competition. All of these factors will have unknown consequences and could affect population health and size in the future.

Scottish River Temperature Monitoring Network

Since 2016, The Tweed Foundation and Marine Scotland Science (MSS) have been monitoring the Tweed water temperatures for a project called the Scottish River Temperature Monitoring Network (SRTMN). The project aims are to understand water temperatures in rivers across the country and how best to mitigate extreme summer temperatures. The SRTMN Tweed network uses 28 Tinytag Aquatic 2 temperature loggers (Figure 1) that record the water temperature every 15 minutes. Since 2016, the data loggers have collected approximately 310,000,000 data points. The data is downloaded biannually by the Tweed Foundation staff and is then sent off to MSS for further analysis. The Tweed Foundation also carries out a basic analysis of the data every year to provide local interpretation of the results.

Figure 1. Tiny tag Aquatic 2 temperature data logger that are used for monitoring.

17 https://www.researchgate.net/publication/333088484_Comparing_the_behavioural_thermoregulation_response_to_heat_stress_by_Atlantic_salmon_parr_Salmo_salar_in_two_rivers

18 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291741/scho0808bolv-e-e.pdf

19 https://www.facetsjournal.com/doi/10.1139/facets-2016-0053

20 https://onlinelibrary.wiley.com/doi/full/10.1111/ele.13989#:~:text=Abstract,leaving%20fewer%20resources%20for%20growth.

21 https://onlinelibrary.wiley.com/doi/10.1111/j.1095-8649.2009.02380.x

River Tweed Water Temperatures for Spring and Summer 2021

River water temperature can be directly correlated with air temperatures, and the average air temperatures throughout the UK in spring 2021 were some of the coldest in the past seven years. The cooler winter and spring months were swiftly followed by two months of above average temperatures for June and July. These trends were reflected in the water temperature data as temperatures increased throughout the spring before reaching a peak of over 23°C in July in the main stem of the Tweed (Figure 3) and the upper catchments of the Teviot, Yarrow and Gala Water – all areas which are nursery grounds for Tweed Salmon and Trout. Both adult and juvenile fish are feeling the effects of high-water temperatures.

Figure 2. Picture illustrating how temperature loggers are placed in river. The temperature logger is covered with white plastic sheath to block the sun from heating the logger up further, allowing for only water temperature to be recorded.

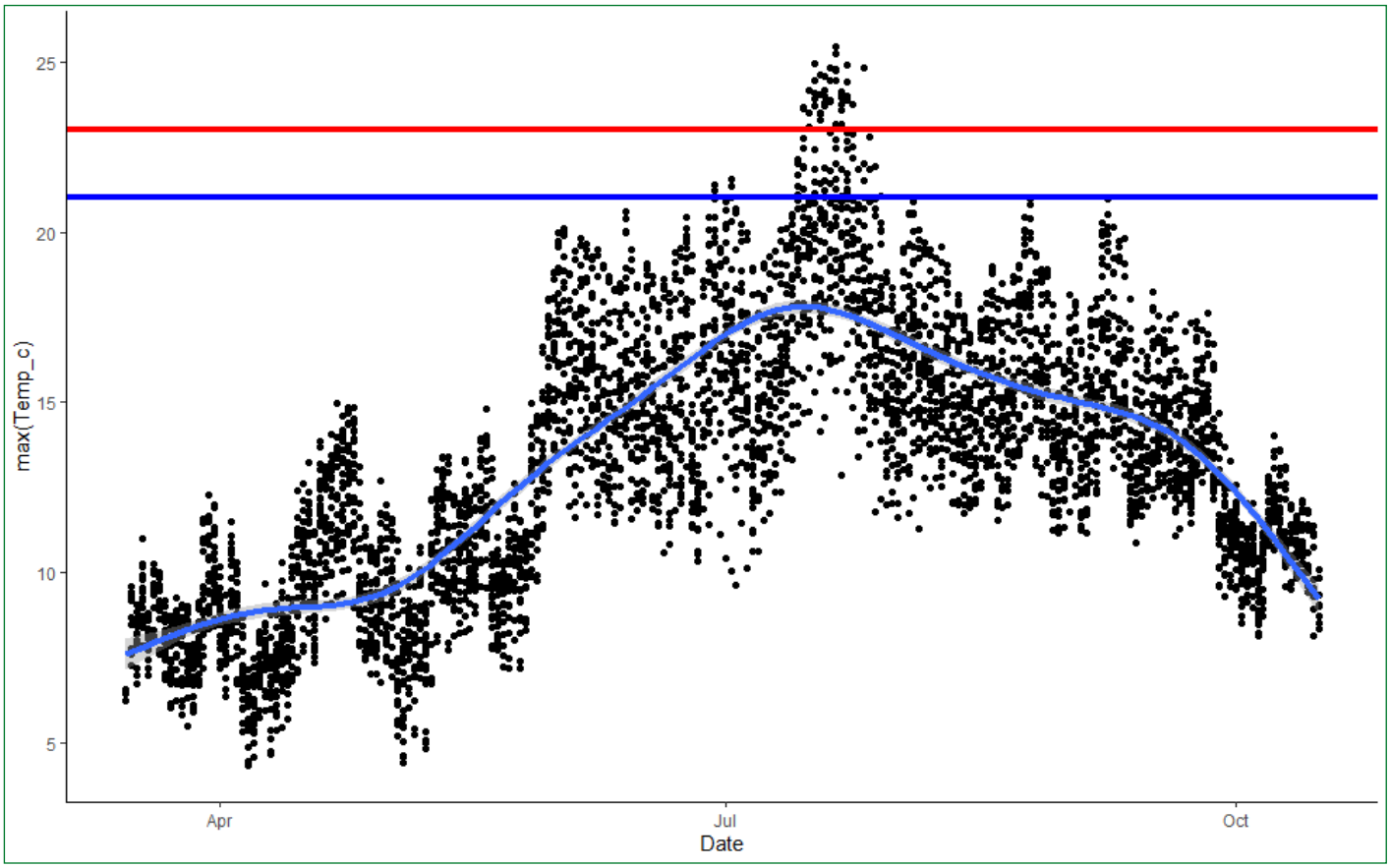


Figure 3 shows March to November water temperatures throughout the catchment. Light blue curved line is the Tweeds average water temperature on the day. Dark Blue horizontal line indicates minimum reported sub lethal thermal stress 21°C[22]. Red horizontal line is temperature for minimum reported lethal thermal levels 23°C[23].

Importance of monitoring the River Tweed's water temperatures

It is important to monitor water temperatures throughout the catchment to identify issues that might go unnoticed and to identify how to mitigate these issues in the future. MSS has analysed the STRMN data and has been able to identify that:

> *"During the summer of 2018, it is estimated that around 70% of rivers in Scotland experienced temperatures over 23°C. UK climate change projections provided by the Met Office indicate that summers like these could occur every other year by 2050, increasing concerns over the future of salmon in Scotland."* September 16, 2021 by MS Communications

MSS has also used the data to develop complex statistical models to inform us where the highest temperatures are likely to be felt within the catchment and where tree planting should be prioritised to mitigate high water temperatures. A breakdown of this information can be found in the Marine Scotland communication blog[22]. One of the key bits of information to take away from the blog is:

> *"Maximum summer river temperatures can be reduced by increasing the amount of water in the river channel, or reducing the amount of sunlight reaching the water surface."*

22 https://blogs.gov.scot/marine-scotland/2021/09/16/resources-to-reduce-river-temperatures-and-protect-atlantic-salmon/

23 https://onlinelibrary.wiley.com/doi/abs/10.1002/hyp.14314

The Latest Riparian Planting Priority Areas

The latest paper from MSS[22] has shown that planting trees in areas with small and slow running streams that flow from east to west will have the greatest effect of reducing maximum summer water temperatures. Conversely planting trees in riparian zones next to streams that are wide, fast flowing, hold a larger water volume and flow from north to south will have less effect on reducing maximum summer water temperatures. Figure 4 is from a paper which shows the effects on water temperatures across the Tweed catchment if trees were planted on both banks (excluding the Whiteadder). There is also an interactive map that illustrates where planting should be prioritised throughout the Tweed catchment.

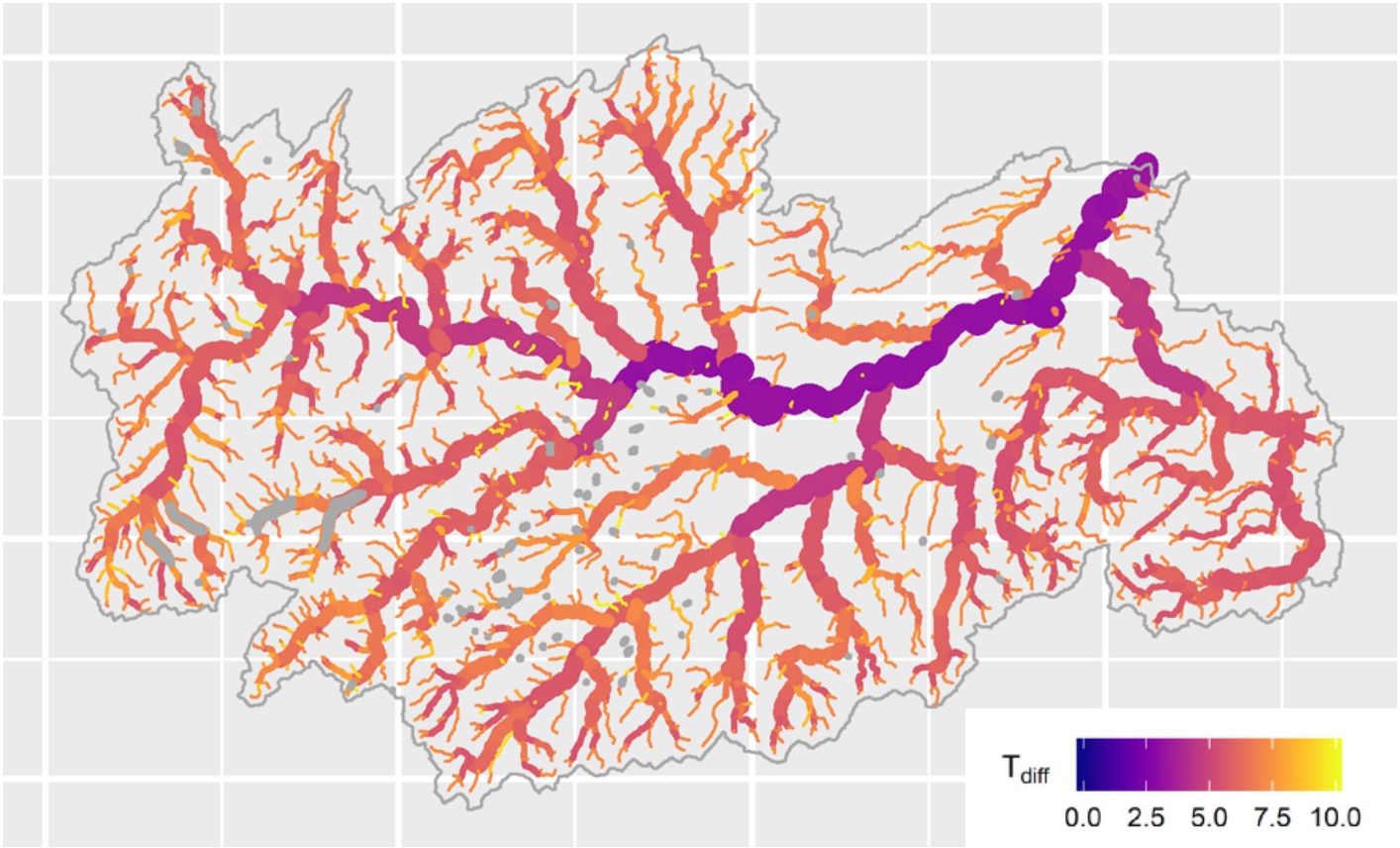


Figure 4. Shows the effects of reducing water temperature by planting up riparian habitat on both banks. Dark blue suggests no effect in reducing water temperature while yellow suggests maximum effect from riparian planting. Figure modified from Jackson, F.L., Hannah, D.M., Ouellet, V. and Malcolm, I.A. (2021)[22].

Rising water temperatures are going to have a greater impact on our fisheries in years to come. These effects are going to be felt throughout the catchment with the headland waters bearing the brunt of the temperature rises. Freshets are a possible short-term mitigation option but their effects on reducing water temperatures within the Tweed catchment are most likely going to be short term and localised and need to be studied further.

Prioritising planting trees in riparian zones therefore still remains the most viable option for future proofing the catchment against rising summer water temperatures. Currently the Tweed Foundation is working with the Tweed Forum to identify suitable sites that could accommodate riparian tree planting to provide shading in critical areas. With temperatures predicted to continue to increase due to global warming in the forthcoming years, the River Tweed's water temperatures are likely to continue to rise. Tackling this issue and taking actions to help manage water temperatures is now a priority.

The Need for Riparian Woodland

Written by Russ Jobson of the Tweed Forum

Marine Science Scotland, under their Scotland River Temperature Monitoring Network (SRTMN), have been collating data on the countries river temperatures and the results are concerning. They show river temperatures are reaching critical levels for the ability of young salmonids to survive. With temperatures predicted to increase further there is an urgent need to manage water temperatures, especially in the headwaters of our catchment.

Tweed Forum has, for many years, championed targeted riparian planting within the Tweed. Working with landowners across the catchment and integrating riparian woodland into their land management to improve water quality, fisheries habitat, reduce runoff and aid with natural flood management.

Native trees next to rivers, streams and lochs – otherwise known as riparian woodland – perform a range of vital functions. Critically, they provide shade which helps reduce the temperature of the water (something that will become even more important due to climate change); they offer vital shelter to wildlife, provide cover for fish and increase the number of insects which fish feed upon.

As such, the riparian zone represents a hugely diverse and important habitat which supports a myriad of invertebrate, bird and bat species and of course the Atlantic salmon.

Working at Scale

Riverwoods, led by the Scottish Wildlife Trust (SWT), aims to builds on the work done by many rivers and fisheries trusts to create a network of riparian woodland and healthy river systems throughout Scotland.

With Scotland's streams and rivers covering an amazing 125,000km, much of it bare of vegetation, improving riparian habitat has the potential to create transformative change delivering significant benefits for wildlife and people and fish.

SWT has been working with a range of stakeholders and interested parties to shape the initiative and Tweed Forum have been instrumental in its development and, alongside Fisheries Management Scotland, are leading on the delivery element of Riverwoods.

RIVERWOODS

Many organisations and landowners are already undertaking river restoration projects, and Riverwoods will provide an opportunity to help join these up across Scotland. It also aims to build a sound evidence base underpinning riparian restoration, support landowners to carry out practical work and unlock private finance to help scale up the efforts to date.

Looking Forward

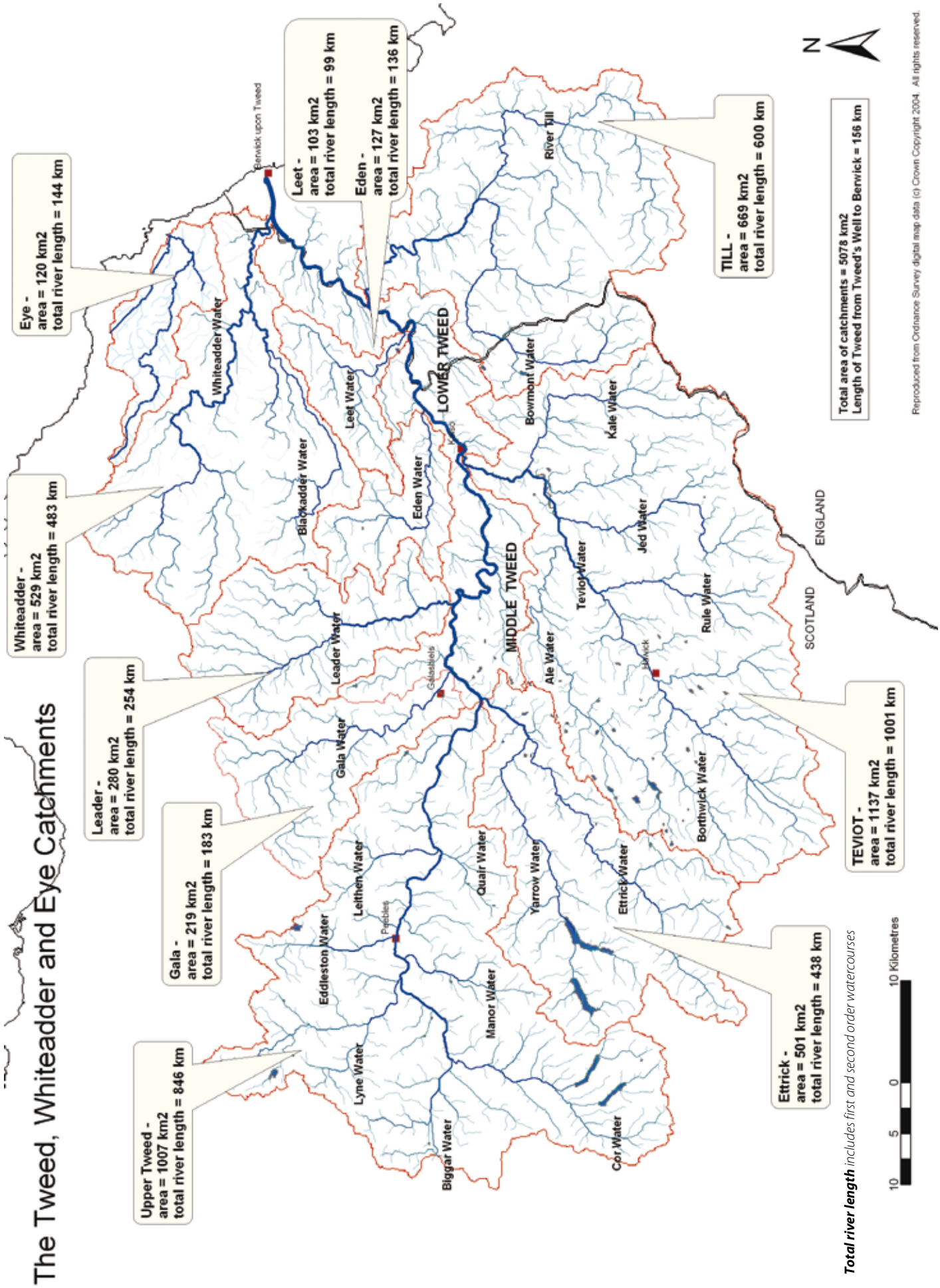
Landowners, managers, and farmers are, of course, key to the increase, expansion, and creation of riparian woodland and this brings with it both challenges and opportunities. Here at Tweed Forum, we strive to get the right trees in the right place and are always looking to integrate woodland creation into the land management business model in a way that does not affect the bottom line and in many cases can actually make money. Tweed Forum has been working closely with the Tweed Foundation to target thermal stress hot spots and help facilitate riparian woodland in these areas.

Adult Salmon numbers are in decline due to a complex combination of factors both on land and at sea. The headwater streams are part of the production powerhouse for salmon, so it is important that the habitat and resilience of these areas through riparian woodland creation is improved and maintained. The River Tweed Commission, Tweed Foundation and Tweed Forum would love to hear from you if you have the scope to integrate some riparian woodland across your landholding.

Of course, the best time to plant a tree was 20 years ago, but the next best time is now!

Tree planting at Crookston, a tributary of the Gala Water.

Map of the Tweed Catchment



Education : Events Snapshot 2021

Following on from what was a challenging year in 2020 with Covid restrictions, we were hopeful that in 2021 there would be more opportunity to participate in shows and events, carry out Tweed Start days and visit schools and community groups. Unfortunately, 2021 continued in a similar vein to 2020 , with Covid disrupting many of the planned education events. However, as the year progressed and the situation around Covid started to ease, we were able to run and take part in several education events.

June

The 2021 events started in June with a visit to Traquair House who were hosting Priorsford Primary 7's residential week. There were several activities put on for the children throughout the day, one of which was an electro-fishing demonstration. Following the demonstration, the children learnt all about the different species of fish and invertebrates living in the river whilst identifying live samples on the bankside.

June also brought about the first Tweed Start day for 2021, when Broomlands Primary School visited the Trout fishery at Roxburgh. The children learnt about the importance of fishing in the area and developed an understanding of why invertebrates and matching the hatch is so important for anglers. They then got to try fishing, with several fish being caught throughout the day.

The Tweed Foundation also provided an electro-fishing demonstration as part of a Connecting Threads event and the Destination Tweed project, a collaborative event bringing together the science and arts communities. Those at the demonstration observed some live samples of fish before learning about the Atlantic salmon and the challenges that they are facing in our rivers.

August

August saw a visit to Coldingham Loch where the Tweed Foundation took part in an angling development day. Children carried out some pond dipping before identifying the invertebrates caught in their samples, learning about their life cycles and their importance in fishing.

August also brought about a first visit for Tweed Start to the Whiteadder Reservoir. The day was well attended, with participating children learning about the ecology of the reservoir while carrying out some pond dipping, before learning how to cast and fly fish for themselves. A great day was had, with a couple of nice Brown trout being caught!

September

With Covid still causing disruption throughout the year, many of the large shows and events were unfortunately cancelled. However, September saw the welcome return of Bang Goes the Borders, although this time as an online event. The Tweed Foundation took part, giving a presentation on life in the river while showing some live samples for the children to view through a camera.

Traquair House were also able to host their Bioblitz in September, a great event where organisations and members of the public all came together to monitor the diversity of species living in and around the grounds of Traquair House. The Tweed Foundation monitored the species of fish present by carrying out several electro-fishing surveys, before then having a stand with live samples of fish and invertebrates on display for the public to observe and identify. Several electro-fishing demonstrations also highlighted to people the abundance of fish in the river.

With Covid restrictions now significantly reduced, we are looking forward to building on their education programme and working with schools and community groups throughout the catchment in 2022.

Trustees and Staff

Stanhope, Upper Tweed

As at April 2022

The Tweed Foundation

Drygrange Steading, Melrose, Roxburghshire, TD6 9DJ
Tel: (01896) 848271 Fax: (01896) 848277
Email: info@tweedfoundation.org.uk
Web: www.tweedfoundation.org.uk
Company No. SC366380
Registered Charity No. SC011055

Trustees

Peter Straker-Smith (Chairman)
Hugh P Younger
Douglas J Dobie
Lord Joicey
John P H Scott
The Duchess of Sutherland *(resigned 6/4/21)*
W Allan Virtue
Sheena A West
Douglas H Younger

Foundation Staff

Jamie Stewart (Director)
Alison Gorrie (Executive Assistant)
James Hunt (Policy & Senior Biologist)
Jonny Archer (Fish Biologist)
Suzanna Taylor (Fish Biologist)
Patrick Barbour (Education Officer)
Barry Wright (Scale Reading Biologist)

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Independent Examiners

Rennie Welch
Chartered Accountants & Registered Auditors
Academy House, Shedden Park Road, Kelso, Roxburghshire, TD5 7AL

Fund Managers

Cazenove Capital Management Limited
18 Charlotte Square, Edinburgh, EH2 4DF

Acknowledgements

The Tweed Foundation is very grateful to Tweed fishery proprietors, the River Tweed Commission, Foundation Benefactors, private donors, Friends of the Foundation, the Scottish Government, Marine Scotland, FishPal, the local Angling Clubs and Associations, and many others for their financial assistance with our studies.

Without this support we would not be able to achieve the very substantial amount of studies undertaken each year on behalf of the River.

Thank you

The Tweed Foundation Limited

(A charitable company limited by guarantee)

Statement of Financial Activities

For the year ended 31 December 2021

	Unrestricted Funds £	Restricted Funds £	2021 Total Funds £	2020 Total Funds £
Income & Endowments from:				
Donations & Legacies	142,180	42,256	184,436	203,332
Charitable Activities	59,694	26,300	85,994	37,793
Governance and Office costs	374	-	374	10,020
Investment Income	23,241	-	23,241	23,017
Other Income	5,701	-	5,701	4,800
Total	**231,190**	**68,556**	**299,746**	**278,962**
Expenditure on:				
Raising Funds	3,987	292	4,279	6,018
Charitable Activities				
Research & Conservation	11,137	59,074	70,211	51,433
Scientific Staff	117,940	7,940	125,880	125,200
Governance & Office Costs	77,328	1	77,329	62,749
Depreciation, etc.	29,073	10,107	39,180	38,260
Total	**239,465**	**77,414**	**316,879**	**283,660**
Net gains/(losses) on investments	36,551	-	36,551	15,642
Net Income/(Expenditure)	**28,276**	**(8,858)**	**19,418**	**10,944**
Reconciliation of Funds				
Total Funds Bought forward	746,439	74,164	820,603	809,659
Total Funds Carried Forward	**774,715**	**65,306**	**840,021**	**820,603**

Extract from the 2021 Accounts

The financial information set out on this page has been extracted from The Tweed Foundation Limited's accounts, on which Rennie Welch LLP, the independent examiners, reported without qualification.

Copies of the accounts are available upon request.

Aims and Objectives for 2021

Primary Objectives

	AIM FOR 2021	ACHIEVEMENT FOR 2021
JUVENILE STOCKS : Smolt tracking	Investigate Smolt survival in the river.	Achieved. 220 salmon smolt were tagged in the Gala Water, either as pre-smolts in early March or as Smolts at the Smolt trap in April. In contrast to the low water conditions in 2019 and 2020, a spate in early May took most smolts out to sea in several days, with an 80% survival recorded, compared to 40% in the two previous years. The report can be found at this link https://arcg.is/10PXnj
JUVENILE AND ADULT STOCKS : Gala catchment monitoring	Organising the Gala Water as an index river for the catchment.	Partly achieved. The annual electro-fishing programme for the Gala Water was implemented, the fish counter was in full operation, samples of juvenile Salmon and Trout were PIT tagged to monitor return rates and a PIT antenna was installed in the fish counter, although there were some detection issues that were discovered later in the year. PIT tagging was also used to estimate the trap efficiency (for total smolt output estimates), with results suggesting this will be possible in years when there is not a significant rise in water levels.
JUVENILE STOCKS : Fry index and electro-fishing	Continue the regular monitoring programme for juvenile Salmon and Trout.	Achieved. The Marine Scotland Science National Electro-fishing Programme Scotland (NEPS) was completed and we are awaiting the results. Fry index results for the Gala and Upper Tweed continue to show stable numbers of Salmon fry. Numbers for the Leader have dropped since the sampling was started in 2007, but are still consistent with results for the Gala and Upper Tweed. The report can be found at https://arcg.is/1TmDv40
ENVIRONMENT : Water temperatures	Future proofing the catchment against increasing water temperatures: identification of areas where tree planting would be most effective in providing shade, and working with others to target those areas as priority sites in which to make agreements with landowners to undertake planting.	Achieved. The monitoring network continues to be maintained, with data provided to Marine Scotland Science. Partly achieved. Discussions are ongoing with Forum regarding strategic tree planting, which requires improvements to the grant funding system to prioritise riparian trees.
JUVENILE STOCKS : Investigate poor areas	Investigation of areas of the catchment where fry numbers are less than are generally found in the catchment: to make sure that the reasons for these are natural and not man-made.	Achieved. Electro-fishing surveys were carried out for the main stem of the Tweed above Lynefoot. The same pattern of low numbers was found above Lynefoot to Dawyck, which we attribute to less productive habitat.

Aims and Objectives for 2021

Secondary Objectives

	AIM FOR 2021	ACHIEVEMENT FOR 2021
BROWN TROUT AND GRAYLING	Tracking of adult Brown Trout to identify migration patterns.	Achieved. Of the 17 Brown Trout tagged in 2019, only 1 Trout was detected in 2021 after spawning in the Upper Tweed. This fish then travelled down to the Middle Tweed. With the end of the tag battery life, all receivers were removed from the middle of the year.
BROWN TROUT AND GRAYLING	Operation of fish traps to study Trout stock structure.	Not achieved. With the departure of Kenny, it was decided that it was better for the new biologist, Jonny Archer, to familiarise himself with other aspects of TF work.
ADULT STOCK MONITORING	Adult Salmon sampling using rod fisheries trial.	Achieved. The Tweed Foundation participated in the national adult sampling programme which was funded by Marine Scotland Science to collect biometric data for adult Salmon (length, weight and age). Sampling was carried out at Paxton netting station for live fish and for beats where Salmon were killed.
MONITORING AND ANALYSIS OF CATCH TRENDS	Floy tagging caught adult Salmon.	Achieved. Floy tagging at Paxton continued, with 62 Salmon and 27 Sea Trout tagged with floy tags.
ADULT STOCK MONITORING	Operation and maintenance of fish counters.	Partly achieved. The Ettrick and Gala counters operated for 2021 without any issues. A significant overhaul of the counting software was carried out by the manufacturer with assistance from the Tweed Foundation. The Whiteadder counter was upgraded with financial support from Ahlstrom-Munsko to produce better video clips. With the Whiteadder counter out of operation for around a month, a final total could not be produced.

Other

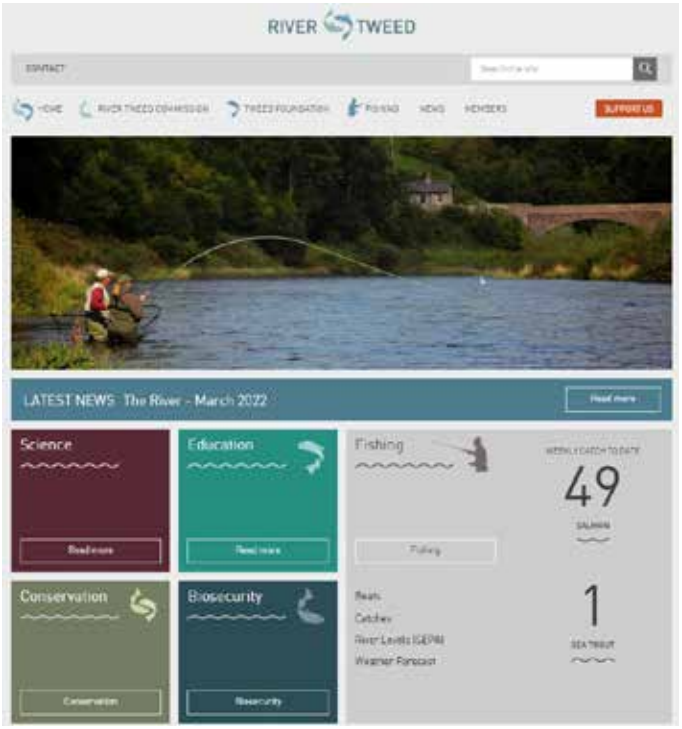
	AIM FOR 2021	ACHIEVEMENT FOR 2021
COMMUNITY	To continue to provide access for less-able anglers through the provision of wheelyboats.	Partly achieved. Wheelyboat provided when Covid restrictions were lifted.
CONSULTANCY	To continue to deliver efficient, good value biological survey facilities to developers and others on the river.	Achieved. Consultancy work was carried out primarily for Hawick flood protection scheme, with numerous fish rescues carried out. A wind farm survey was carried out and a data retrieval exercise.
EDUCATION	To continue educational meetings and publications explaining the work of the Foundation and the natural histories of our fish species to a wide audience. To expand our work with schools under the 'Go Wild for Fish' banner.	Partly achieved. Due to Covid, access to schools was limited, but did allow time to develop educational material. The development of the office meeting room into an education facility continued. The monthly 'The River' continues to be produced and circulated to fishing beats and posted on social media.

Find Us on Social Media

River Tweed Website
www.rivertweed.org.uk

After several years in the pipeline, 2021 saw the new River Tweed website go live. The River Tweed site brings the old River Tweed Commission, Tweed Foundation and River Tweed News sites all together into one. There is also a fishing section displaying information and catch figures for all fishing beats on the River Tweed.

In combination with our social media presence and *The River* newsletter, the new site represents an important step forward for improving our communication with fishing interests and the general public. With the site now live and all the information on one site, we hope it makes it easier for users to find all of the information they might be looking for.



Watch Tweed TV

Videos and film clips of our work and information for anglers
https://www.youtube.com/user/tweedfoundation

The Tweed Foundation

Our Services





The Tweed Foundation provides a range of biological and environmental consultancy services for both the private and public sectors in the Tweed District

*** Biological Surveys**: Fish & Lamprey populations; Invertebrate populations ***Data storage and mapping advice** ***Fish rescues** ***Environmental Impact Assessment surveys and monitoring** ***Scale reading and interpretation** ***Fisheries Management planning advice** ***Catch data analysis**

All our biological staff are trained, are highly experienced and have extensive knowledge of the Tweed catchment. Bespoke data, collected for specific tasks, can often be matched and compared with other data from our long series of records which have been collected over many years. This can give a more robust picture of environmental factors than simply taking spot samples.

For more information: http://www.tweedfoundation.org.uk/html/our_services.html

Friends of The Tweed Foundation

As a charitable trust, The Tweed Foundation relies on the support and generosity of many organisations and individuals to help fund its work. If you would like to help The Foundation, or make a donation, please fill in the form below, or contact us.

Your Details

Name: _____

Address: _____

_____

_____

Postcode: _____

Tel: _____

Mobile: _____

Email: _____

Friends of The Tweed Foundation

I enclose a cheque, payable to The Tweed Foundation, made up as follows:

☐ Annual Friendship	£	20
☐ Joint Annual Friendship	£	30
☐ Annual Benefactor	£	250
☐ Life Friendship	£	2,500
☐ Donation	£	_____
TOTAL CHEQUE	**£**	_____

The Tweed Foundation also has a Benefactor Scheme. Further information about this category of membership is available on request.

Standing Order Mandate

If you would like to pay future subscriptions as a Friend of The Tweed Foundation by Standing Order, please complete the following:

Name: _____
[Please Print]

To: _____
[Bank Name]

Of: _____
[Full Address]

Please pay: _____
[Enter relevant membership fee in words]
pounds to The Tweed Foundation (Sort Code 82-63-23, Account No. 00125078)
on the 15th January _____ [enter year] and each year thereafter until further notice.

Signed: _____ Dated: _____

Account Name or Number: _____

Sort Code: _____

Please send to: The Tweed Foundation, Drygrange Steading, Melrose, Roxburghshire, TD6 9DJ

Please Support Our Work By Making A Donation

Complete for all Donations

I would like The Tweed Foundation [Registered Charity No. SC011055] to treat all donations made since 6th April 2000, and all further donations made from the date of this declaration, as Gift Aid until I notify you otherwise.

Please note that Gift Aid can only be claimed on payments made from your personal funds.

Funds from limited companies, associations and other charities are not eligible.

Your Details

Surname: _____

Forename: _____

Title: _____

Address: _____

_____

_____

Postcode _____

Tel: _____

Mobile: _____

Email: _____

Please tell us if:

- You change your name or address while the declaration is in force
- You no longer pay tax on your income or capital gains tax equal to the tax the charity claims
- If you wish to cancel your declaration at any time. All subsequent donations from the date of cancellation will be deemed as non gift-aided

Note:

- If you pay tax at the higher rate, you can claim further tax relief in your Self Assessment tax return
- Keep a copy of this form for your tax affairs and your own record
- The Tweed Foundation will benefit from tax recovery

Signature: _____

Date: _____

I would like to donate the sum of £ _____ As a Gift Aid Donation to The Tweed Foundation

(Cheque/cash enclosed. Only complete if you wish to make a one-off donation)

For Making Annual Donations by Standing Order – Please complete this section

To The Manager:

Bank/Building Soc: _____

Address: _____

_____

_____

Postcode: _____

Account No:

☐☐☐☐☐☐☐☐☐☐

Sort Code:

☐☐☐☐☐☐

Please Credit

The Tweed Foundation
Clydesdale Bank
9 High Street, Galashiels, TD1 1RY

Account No: 00125078 Sort Code: 82-63-23

With the sum of £ _____ (pounds)
as a Gift Aid Donation

On the _____ (day)

of _____ (month)

20 _____ (year)

And the same day each year onwards

In all cases, please return this form to: The Tweed Foundation, Drygrange Steading, Melrose, TD6 9DJ

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