The Tweed Foundation

2012 Annual Report

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The Tweed Foundation's Annual Report 2012

Published June 2013

Chairman's Report

I succeeded Andrew Douglas-Home as Chairman in March 2012. Unlike him, I had little previous involvement with The Tweed Foundation and I am now beginning to understand the complexities involved in applying a fisheries management plan to a catchment the size of the Tweed.

It involves collecting and analysing a huge amount of data annually using a high level of expertise in electro-fishing, scale reading, tagging, etc. It also requires imagination and a certain amount of lateral thinking to bring all the elements together to provide meaningful insight and advice.

2012 saw the conclusion of the Living North Sea study on Sea-trout and everyone attending the recent seminar at The Ednam House Hotel was hugely impressed at the quantum leap in our understanding of Tweed Sea-trout and Brown Trout, resulting from that three-year study. It will change the way this species is perceived and managed in the future.

A substantial part of that work was EU grant-aided and it is a fact that in the past the breadth of work undertaken by The Foundation has been partly facilitated by annual direct funding from The Scottish Government (through the Rivers and Fisheries Trust of Scotland, RAFTS), and project-specific grants such as for the Tweed Trout and Grayling Initiative, and Living North Sea.

2013 will, however, be the first year, almost since The Foundation's inception, that there is no suitable project funding available. At the same time, the Scottish Government has withdrawn all direct financial support to fisheries trusts. The Foundation can see no prospect of this situation changing in the foreseeable future and it would be a significant backward step not to continue with the breadth and depth of work being carried out within the current Tweed Fisheries Management Plan. To do so, however, requires additional core funding from private sources in future.

I am, therefore, looking forward to working with The Foundation to develop new sources of funding and to increase the subscription base. Any help from existing members would be gratefully received and if each of you brought one other friend, colleague, or fellow angler on board it would help enormously.

Douglas Dobie

Director's Foreword

This report is an update of The Foundation's policies and priorities which are identified in the Tweed Fisheries Management Plan. The full Plan, which is reviewed and agreed with the River Tweed Commission each year, is available on The Foundation's website.

Some years ago, a friend who was born and bred on the River, told me (I know tongue in cheek) that in his view it was dangerous to have too great an understanding of how the Tweed ecosystem worked. To do so, he maintained, was to spoil its mystique particularly in respect of the guile which was required for fishing. In some respects he was correct but I disagreed with him then and I still do now. So often the workings of the River, and especially when things are not working as people expect, can be explained and sometimes solved by biology. If we don't understand why something is not up to our expectations we have little chance of taking useful actions to rectify it. For example, trout anglers often claim that there are less takeable trout than there used to be. I am sure that they are sometimes correct, but sometimes they are not: there are fishermen who can still catch good-sized trout in many parts of the system, even where others cannot. What is important of course is to be able to establish if it is correct or not, and the only way to do that is to understand the fundamentals. In this case, it certainly includes invertebrate life but also the access to spawning burns, so we need to know where these are, and perhaps also the relationship of Brown Trout with Sea-trout, which are the same species. We are just starting to understand this latter aspect and it may explain far more than we thought. It may also change management policy and eventually even the law. So, while my friend had (and probably still has!) a perfectly reasonable bystander's point of view, The Foundation exists to make a difference and to do that we must have information: good information that will stand up to scrutiny and be useful to all who can make decisions that will make that difference.

One of the (few) good aspects of the recession is that we are now seeing a far more effective division of labour between managing agencies in the District. Fortunately, some years ago we moved from the situation when none spoke with any other. There then followed a period where on many occasions multiple agencies and people were all involved in decision-making simply because no one liked to defer to another. With more financial constraints this has discontinued and now, with ever improving communications, managing bodies are much more willing to take the advice of those who have real knowledge or experience. What The Foundation brings so often is that hard evidence, the presence or absence of a species, recorded changes that have taken place, or clear problems that we know need to be improved but so often need the public purse to make a change.

It is, of course, very unlikely that anyone will be able, or indeed would want to be able, to make a change to, for example, the changing size of returning Salmon. But to understand it and put it into context not only allows decisions to be made with regard to stock conservation but also to feed anglers appetite for information about their quarry. The same applies to the movement of smolts, the impact of predation, and to discrimination of different stocks, all of which we write about in this report. Biology is a most useful management tool and thankfully my friend remains a strong supporter of The Foundation.

Nick Yonge

Fish Stock Structures

Rationale: The most basic information needed on the Salmon and Trout of the Tweed is their stock structure: is each species just one interbreeding stock throughout the whole catchment, or are there stocks differentiable by their life-histories and / or genetics. The 10 month long Salmon fishing season of the Tweed depends on a wide range of stocks of different characteristics and each of these has to be defined and conserved. Work on this is with genetics and scale reading. (FMP INPUTS 2A, 3A, 4A.1)

(FMP = Fisheries Management Plan)

FASMOP* Salmon Genetics Survey: A report on this has been produced and is available on The Tweed Foundation's website. As was becoming apparent last year, it will not be economically viable to map the population structuring within the Tweed until the SNPs** technique becomes cheaper, so that enough of them can be utilised. There are indications of structuring, but the differences are not strong enough to be able to assign individual fish back to their area of origin with the requisite 90% certainty that is needed for management purposes. Inevitably, new questions have arisen from this work, such as why the Whiteadder, a new population that recolonised only in the 1980s, should apparently be so different from the rest of the catchment.

** FASMOP = Focussing Atlantic Salmon Management on Populations*
*** SNPs = Single Nucleotide Polymorphism. Pronounced "snips", it is a DNA sequence variation occurring when a single nucleotide (A,T,C or G) in the genome (or other shared sequence) differs between members of a biological species.*

Hybridisation: One of the incidental points that came out of this survey work was that the Manor Water again produced a sample of "Salmon Fry" that had a high proportion of first generation trout:salmon hybrids in it – 7 out of the 50 taken. The Manor has a history of this, as shown in the table below.

Reference	Date of Sample	No. of Hybrids	No. in Sample	% Hybrid
Jordan & Verspoor 1993	1987	4	35	10.3
	1988	2	44	4.3
	1989	1	44	2.2
	1990	2	65	3.0
FASMOP 2013	2009	7	50	14.0

The Jordan & Verspoor survey was of the whole of Britain, sampling fish from 43 sites in 23 river systems. Of the 3,389 juvenile salmon tested, 34 were trout: salmon hybrids (1%) but 22 of these hybrids came from Tweed sites, where the overall rate of hybridisation was 3.4%, though reaching 14.6% at a Leader Water site.

The hybrid shown in the photo has a distinctly orange coloured adipose, a trout feature, but its pectoral fin stretches right back to the beginning of its dorsal fin, a Salmon feature. The red spots are more of trout feature but the more prominent "parr markings" on the side are more of a Salmon feature. However, it has been found that an orange or pink colour in an adipose fin is not necessarily the mark of a hybrid, pure Salmon Fry can have this colouration as well.

A Trout: Salmon hybrid Fry (upper) and a Salmon Fry (lower) from the Gala Water

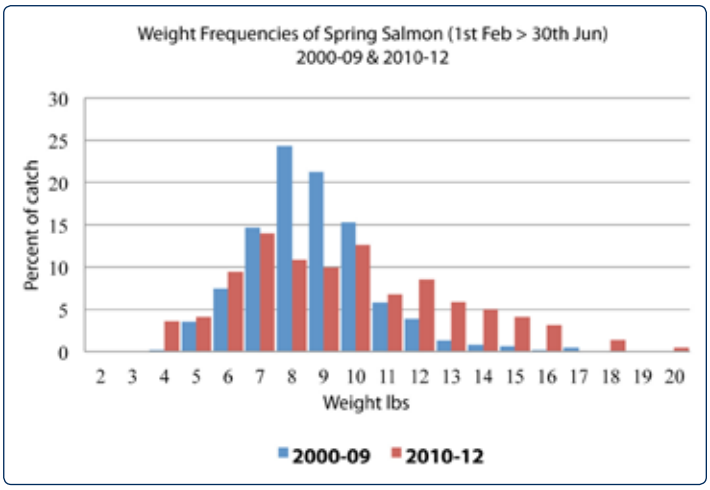
Why the Tweed in general and the Manor in particular have such a high rate of hybridisation is not obviously apparent. One possible reason is that there is no size difference between Salmon and Sea-trout on the Tweed: there are two pound Salmon and twenty pound Sea-trout here, reducing the difference between the species. This could perhaps indicate that the Manor was the home area either of very small Salmon or very large Sea-trout. Though hybrids are usually sterile and their juveniles have poorer survival, a hybridisation rate of a few percent a year should not impact either the Salmon or the trout populations of the Manor.

Fish Stock Structures

Rationale: For Salmon and Sea-trout, analysis of catches for their composition shows which stocks (and areas of the catchment) are producing the fish that support the fisheries. Knowledge of trends and cycles in catches allows annual figures to be judged in a wider context.

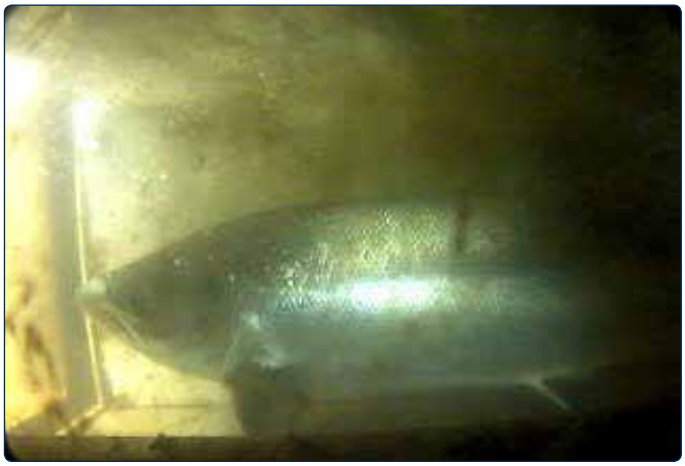
For Salmon, catches that are dependent on only one age class of fish are more susceptible to fluctuations, from various factors, than those that exploit two or more age groups of fish: vital information if the significance of fluctuations in catch totals is to be properly assessed. Historic records show how the sizes and run timings of the fish have varied over the years and give the context for assessing the present day situation. Establishing long-term trends will show large-scale changes that cannot be countered, though could be managed. Variation outside known parameters from the past could be a warning sign of problems. (FMP INPUTS 2D, 3D)

Salmon - Size Matters: The most notable feature of recent years has been the increase in the numbers of larger Spring Salmon caught, a major break with the past on the Tweed, where Spring catches have always been dominated by 8lb fish. The speed of the change can be shown by comparing the sizes of Spring Salmon caught at a lower Tweed beat from 2010 to 2012 with the sizes caught from 2000-09:



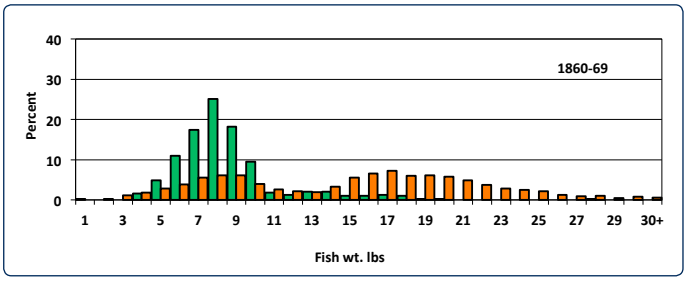
The traditional peak at 8lbs was still obvious in the 2000-09 catches, but in the 2010-12 catches, 8lb fish are less frequent than 10lb fish, the first time this has been the case in 150 years of records. The long "tail" of fish of 12lbs or more is also a new feature. While the sizes of Spring fish have only changed recently, the sizes of Autumn fish have a history of change over the last 70 years. In the following graphs the frequency of the different weights has been calculated as their percentages of the total catches made in the first and second halves of the season, i.e. the frequency of 8lb fish in the first half of the season is given as the percentage they make up of the total catch from the 1st February to the 30th June while the frequency of 8lb fish in the second half of the season is given as the percentage they make up of the total catch made from the 1st July to the 30th November. This is done because when Spring fish are the dominant type, Autumn catches can be in very low numbers and vice-versa so annual catch totals are, in effect, the catch totals of only the dominant half of the season. In the graphs, the first half catches are the green columns, and orange the second half fish.

The falls on the College Burn

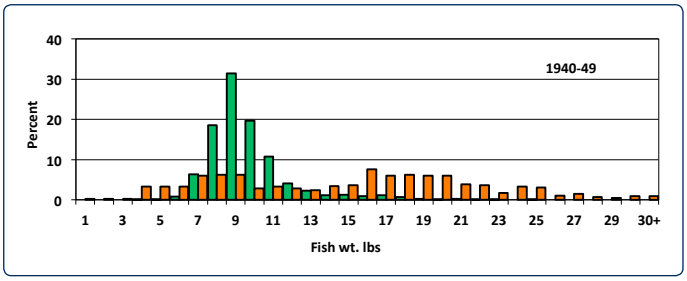


A Spring Salmon of 109cms in length passing through the fish counter on the River Whiteadder

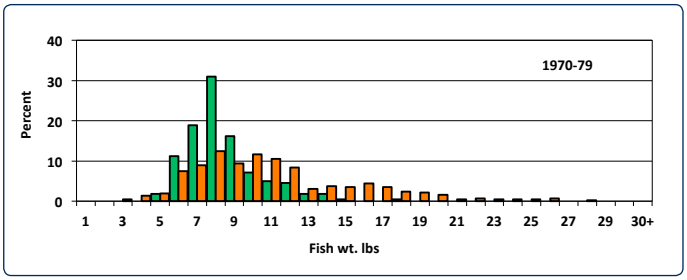
Fish Stock Structures



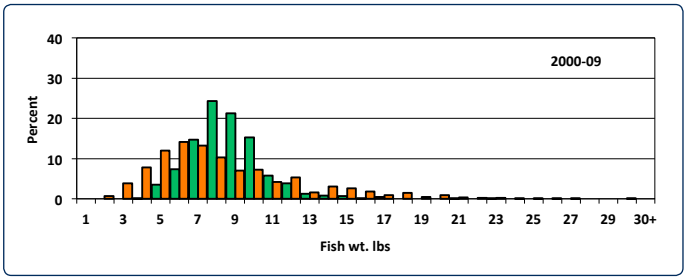
Back in the 1860s, when Autumn fish were dominant, multi-sea-winter (MSW) fish were a large part of their catch as can be seen by the spread of second half catches (orange columns) from 15 to 25lbs. Spring catches have a sharp peak at 8lbs, which was to be their form for the next 150 years.



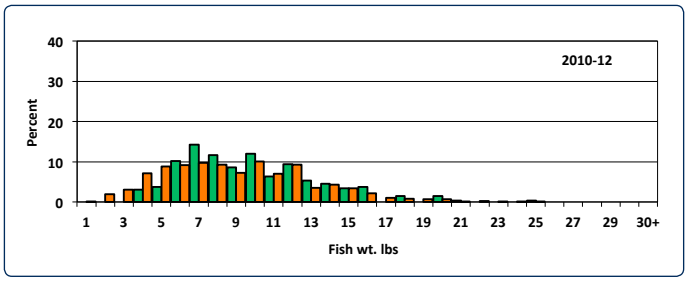
The pattern was still the same in the 1940s, though this was in the middle of the Spring-dominated phase that started around 1915.



However, when the dominant run-type changed back to Autumn fish in the late 1960s, it was one-sea-winter (1SW) Grilse that were dominant in the second half, not MSW as had been the case in the previous Autumn-dominated (c.1860-1915) and Spring-dominated (c.1915-1965) phases.



Further change is apparent by the 2000s, with more small Autumn Grilse, so that for the first time fish of 6lbs and under are commoner in the second half of the season than in the first. Large MSW Autumn fish are now only a small proportion of the Autumn catch.



When this trend towards smaller Autumn fish is combined with the recent trend to larger Spring fish the result is, for the first time in 150 years, that there is no significant difference in the size frequencies of the fish caught in the first and second halves of the season.

Weights of fish before July and after June

Weights of fish	before July	after June

It is important that these changes be kept track of, but the great increase in Catch & Release has meant that most fish now caught in the Tweed have their weights estimated rather than measured. The effect of this can be seen in the last graph where both the 10lb and 12lb categories are out of proportion to their neighbouring categories, which is obviously unnatural. To maintain the integrity of the catch records, which are such an important resource for the management of the river, nets with in-built weighing scales should become the standard.

Sea-trout

Scale Collection: Scales collection continued as did the reading and entering into the scales database of Sea-trout scales collected over the last 20 years; the first results from this are now becoming available.

One of the most interesting populations found (so far) is the Whitling* of the College Burn, a tributary of the Bowmont / Glen, the main tributary of the Till. The College Burn rises on the northern side of The Cheviot and falls over the Hethpool linns, one of the few significant waterfalls in the Tweed catchment, about 2kms from its confluence with the Bowmont. These linns appear to be generally impassable to Salmon as no juveniles have been found upstream of them, though one adult has. Many hundreds of Whitling, however, do pass them each year, from June onwards.

This means they are fish that can be sampled in their home spawning area through the summer and in 1997 and 98 the electro-fishings were in June and July. However, it became apparent that it was better to wait until after the first spate of autumn, in late August / early September, in order to get a larger sample and to be able to identify the sexes of the fish.

In all, some 325 Whitling have been measured, sexed and had scales taken though, as most of them have been in fresh water for some time (the main run of Whitling up the Till is in April and May), only 177 sets of scales are fully readable, with another 60 having only the adult life apparent. The most obvious feature of these fish is their uniformity of size as is apparent in the photograph. 50% of the fish are from 400 to 439mm in length, a spread of just 40mm, and 70% of them are from 390 to 449mm, a spread of just 60mm. They are also very uniform in their life histories as shown in the table below.

Their life history patterns show that they are a structurally vulnerable, as well as a geographically vulnerable, population: not only do they inhabit a small geographical area, their population structure has little overlap between years. Almost 70% are the same age, 2.1+ fish (4 winters old, including the winter in the gravel as eggs), so if any factor were to hit an age-class (e.g. spring floods destroying newly emerged fry; a dry spring delaying smolt migration; a very dry summer and autumn preventing return up the linns, etc.) it would result in reduced spawning from that age class which would take several generations to repair. As 2.1+, 3.1+ and 4.1+ age-classes share the same smolt year, totalling 88.6% of the adult population, any severe impact on a smolt run would have long-term consequences. If two successive age-classes were to be decimated at any life-cycle stage, then the population as a whole would be very badly affected and would take many years to recover.

Whitling captured during sampling on the College Burn

College Burn Whitling

Smolt ages	**S1**	**S2**	**S3**	**S4**
	0	77.7%	21.7%	0.5%
Winters at sea before 1st Return	**0SW***	**1SW**	**2SW**	**3SW**
	3%	97%	-	-
Repeat spawning adults (1)	**1sm**	**2sm**	**3sm**	**4sm**
	9.3%	1.7%	-	-
Adults 1st spawned as Blacktails(2)	**Previous Year**		**Two years previously**	
	1.3%		0.4%	
Total ages	**3yrs**	**4yrs**	**5yrs**	**6yrs**
	71.6%	23.3%	5.1%	-
Commonest life histories	**2.1+**	**3.1+**	**2.1+sm+**	**Other**
	69.9%	18.2%	5.1%	6.8%

** Fish that return to the river in the same year that they smolted, "Blacktails".*
(1) Fish that return to spawn for a second or third time.
(2) Fish that first spawn as Blacktails, then return to spawn again.

** "Whitling" is the general East coast name for a Sea-trout that returns to freshwater, and sometimes spawns, in the same year that it went to sea as a smolt, so its first adult Winter is spent in fresh water rather than in the sea; on the West coast these are generally called "Finnock". However, on the Tweed, where this behaviour is uncommon, "Whitling" means a small Sea-trout of 1 ½ to 3lbs that has spent one or two Winters at sea and the Till is particularly noted for these, though they occur throughout the catchment. Some "Finnock" do occur in the Tweed however, but are called "Blacktails" and the surveys of the College Burn did find a few of these, showing that they had come far upstream and were therefore probably going to spawn – and some older fish showed the marks of having spawned first as Blacktails.*

Juvenile Salmon & Trout

Rationale : Monitoring the abundances of juvenile Salmon in the different parts of the catchment shows how well the spawning areas are being filled with young. Monitoring of smolt runs can also show how many have signs of damage by predators. (FMP INPUTS 2C, 3C & 4C)

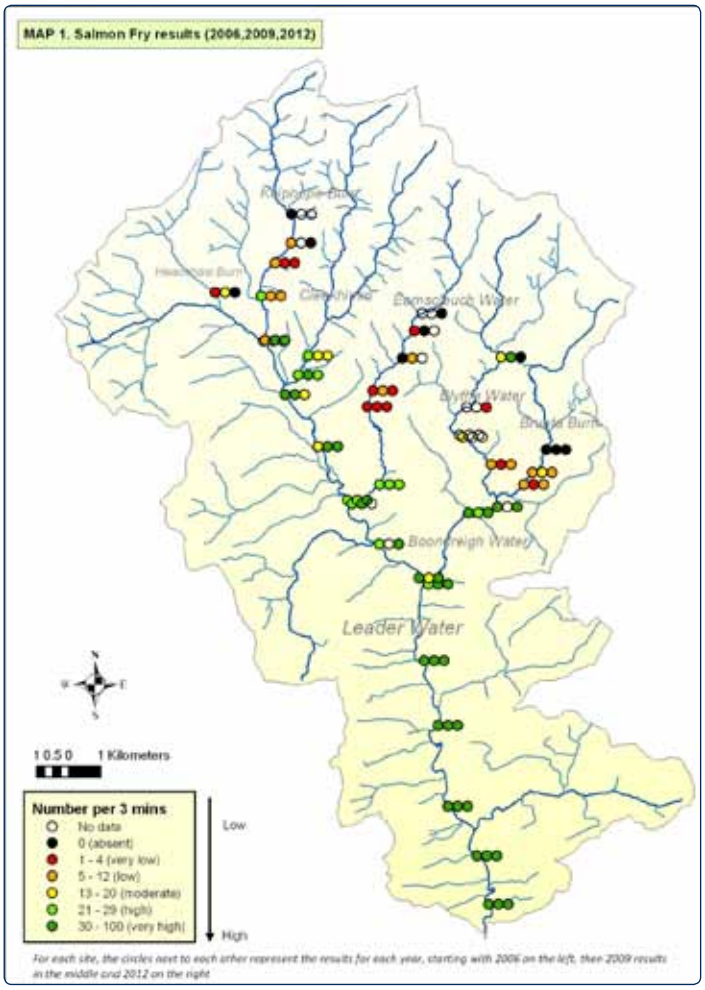
Salmon: The Fry Index sites on the Leader, Gala and Upper Tweed were sampled in 2012; unfortunately, the quantitative* sites required for the Water Framework Directive assessment made by SEPA were unable to be sampled due to the high water conditions.

Using the fry index timed* methodology, the Leader and Gala catchments have now been sampled three times, and the Upper Tweed twice. Very consistent Salmon Fry results were found for the main channels of the Leader and Gala Water with the majority of results in the 'High' to 'Very High' categories, indicating that there is adequate spawning and good instream habitat in these areas. The only results of concern were for the Blyth Water (a tributary of the Leader Water), where low numbers of Salmon Fry would appear to be attributable to access problems caused by a bridge apron at Dod Mill.

The Upper Tweed results were more variable, mainly due to this sub-catchment being a mixture of different tributaries with different factors influencing results. The repeat survey of this area highlighted the key spawning areas for Salmon, which include the Manor Water and the middle and lower sections of the Quair Water and Lyne Water. Unfortunately a number of the main channel Tweed sites could not be sampled due to persistently high water levels. The Leithen

Electro-fishing on the Douglas Burn, Yarrow Water

Water results require further investigation as the numbers of fry decreased at all of the sites in the middle and lower sections. An access issue for adult fish caused by a gravel build up at the confluence with the Tweed is currently being investigated.



Salmon Fry Electro-fishing results from the Leader Water

In addition to the regular electro-fishing rota, follow-up electro-fishing surveys were carried out above two known obstructions on the Till system; the Haughhead Ford and Hedgeley Bridge. The Haughhead Ford has been an on-going problem for a number of years with the electro-fishing results showing that it is an almost complete barrier to adult Salmon and a partial barrier to Trout. A fish pass was installed in the Hedgeley Bridge apron in late October 2011 but the poor electro-fishing results for Salmon and Trout Fry suggest that there are still a lack of spawning fish getting upstream. It is most probable that the fish pass was installed too late in the season for complete adult fish passage. As the Till is being surveyed again in 2013 as part of the regular rota, another check will be made on this area.

**Electro-fishing methodology*

Quantitative electro-fishing : A method that is used to electro-fish a defined area (normally at least 100 $m^{2)}$ to produce a density estimate for juvenile Salmon and Trout (Fry and Parr).
Timed electro-fishing : Carried out for a defined length of time (3 or 5 minutes) to produce a catch per unit effort figure. The Tweed method focuses on Salmon and Trout Fry that occupy shallow riffle areas.

Juvenile Salmon & Trout

The Douglas Burn, Yarrow Water

Brown Trout: Trout are sampled by electro-fishing with the numbers caught during three-minute timed samples giving an indication of the numbers of trout present and the health of the burns. During 2012 the trout burns of the Leader, Gala, Upper Tweed and Upper Ettrick were surveyed.

The Douglas Burn, Yarrow Water. Recording the electro-fishing catch

Juvenile trout numbers throughout the areas sampled were generally good and there was very little change from the last time they were surveyed in 2009. One exception was the area around the Fruid and Talla reservoirs in the Tweed headwaters where damming, water extraction (for reservoirs), and natural waterfalls are all impacting on trout production through reduced connectivity with the Tweed.

In addition, the results revealed a small number of other instances where trout numbers within burns appeared to be below what would be expected and each of these is being investigated further.

Etrrick Water. Trout fry hiding in amongst the stones

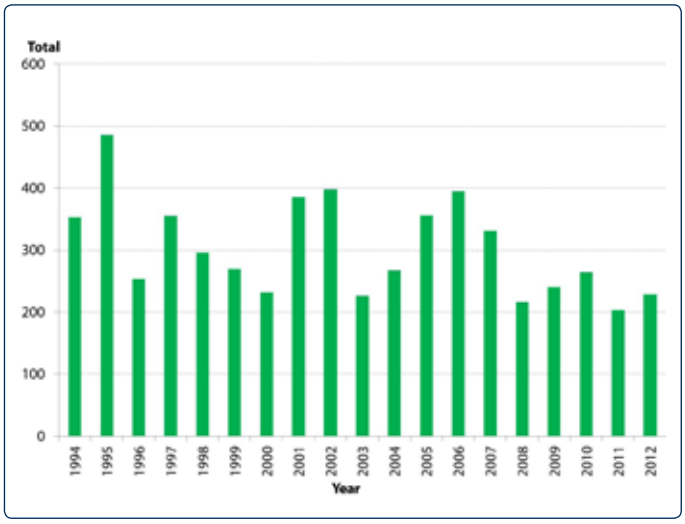
Predation

Goosanders on Tweed

Counts of Fish-eating Birds: Regular counts on the main stem of the river from the Peel Bridge (7 km upstream from Ettrickmouth) down to Berwick Upon Tweed are carried out every year by the River Tweed Commission and Tweed Foundation staff in January, April, May and October for Goosanders and Cormorants. All of these counts have been carried on since 1999 (though the January count started in 1994) and now provide a good baseline of data to assess changes in numbers over this period. Since 2010, counts are also regularly made on the Lower Teviot and Till catchments to provide a better understanding of numbers in the larger tributaries.

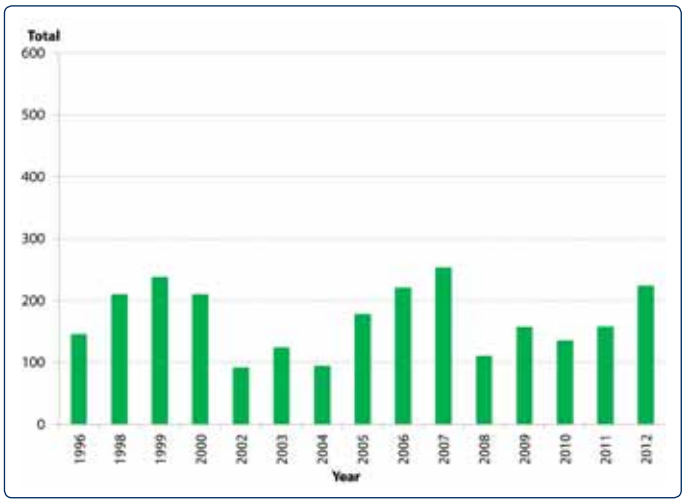
The most representative population count for Goosanders is for January when all of the males have returned from their annual migratory trip to northern Norway and are predominantly in the main channel of the river along with female and immature Goosanders. The April and May counts show a notable decrease in numbers as female birds migrate into the tributaries and males return to northern Norway to moult. Counts for October are the most erratic due to highly variable migratory patterns in this period. All of the collected data is used to inform the license application for mitigating economic damage to Salmonid fish stocks.

The key finding from the counts carried out since 1999 is that a small downward trend in numbers can be observed in January for Goosanders (as shown in the graph), but there are no other evident trends for Goosander or Cormorants.



Goosanders counts for January

The April count graph (below) for Goosanders shows the decrease in numbers from January and the absence of any trend since 1999.



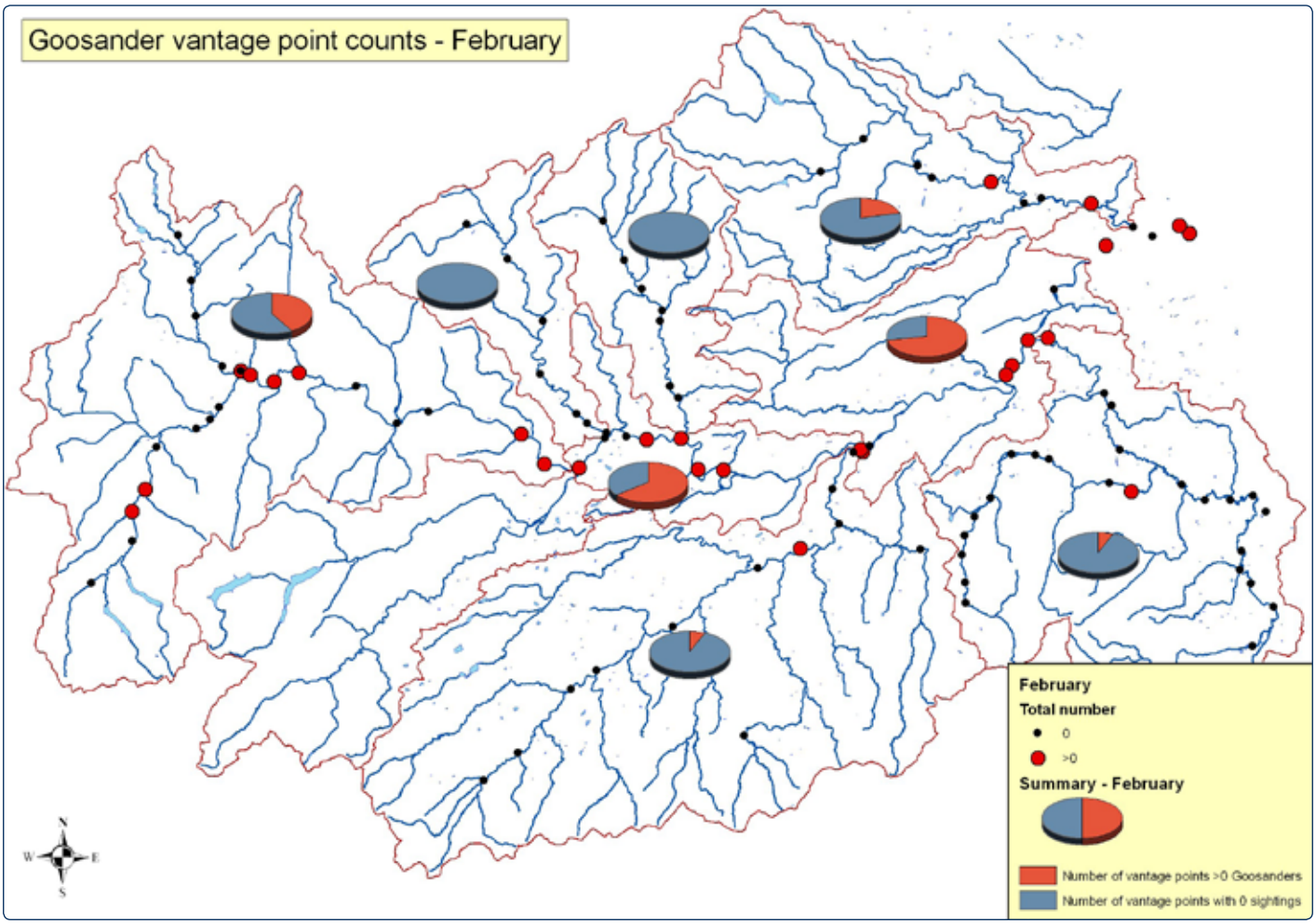
Goosanders counts for April

A criticism made by the Goosander and Cormorant license assessors is that the total number of counted birds is not representative of the Tweed population due to the limited coverage of the main stem counting sections. To address this issue, two additional modes of monitoring were carried out in 2012:

1) Vantage point counts. To provide coverage of the catchment as a whole, counts from road crossings and high points with good views of the river were carried out in February, April, May and October on the main stem of Tweed and on all of the main tributaries. As a quick and simple method, the outline results from this research showed that the majority of Goosanders were found to be in the Middle and Lower Tweed with relatively small numbers on tributaries such as the Leader Water, Gala Water and Till.

2) Relationship between historic main channel and tributary counts. Between 1994 and 2001, extensive bird counts of the Tweed and tributaries were carried out by River Tweed Commission and Tweed Foundation staff, angling club members, and RSPB volunteers in January. On average, 245 km of tributaries and 83 km of main channel (Ettrickmouth to Berwick) were surveyed. For each of these years there is a good relationship between numbers of Goosanders in the main channel and those in the tributaries. This means that the more birds that are counted in the main channel, the more are counted in the tributaries. This relationship is close enough to be used to estimate the total number of birds in the catchment in January in the years since 2001 when the tributaries have not been counted. For example, if 500 birds are counted on the main channel, an estimation of 302 birds in the tributaries can be made, producing a total of 802 Goosanders.

A Common Cormorant



The red and black circles indicate the presence or absence of Goosanders at each vantage point. The pie charts summarise the data for each sub catchment.

Living North Sea Study

Rationale: Joining the European North Sea Region Programme, enabling the Living North Sea Study to take place, not only provides support for the work on Sea-trout adults and juveniles within the Tweed system, that is in the FMP, it also gives the opportunity to learn more about them in the sea. The links and connections between Tweed Sea-trout and other populations around the North Sea are also being studied for the first time . (FMP INPUTS 3A, 3A.2, 3A.3)

In April, The Foundation hosted a workshop on Fisheries Management and Molecular Genetics. Applied fish population genetics, using new molecular technologies, has great potential to improve fisheries management in relation to salmonids. The purpose was to exchange information on these new molecular genetic technologies, to discuss key research priorities in applying technologies in the management of salmonid fishes, and to identify strategic ways of working together with scientists to deliver this. Research groups from all over Europe were represented and discussed summaries of their latest work and ideas. Over the two highly productive days at Drygrange, the scientists also visited Tweedswood to learn how a Tweed Salmon beat was managed and were given a casting demonstration by boatman Kevin Patterson. The meeting was chaired by Professor Eric Verspoor of Aberdeen University.

The Director addressing delegates at Drygrange discussing the genetics work of the LNS study

Tweed Foundation Salmonid Genetics Seminar
Delegates at Tweedswood, Tuesday 17th April 2012

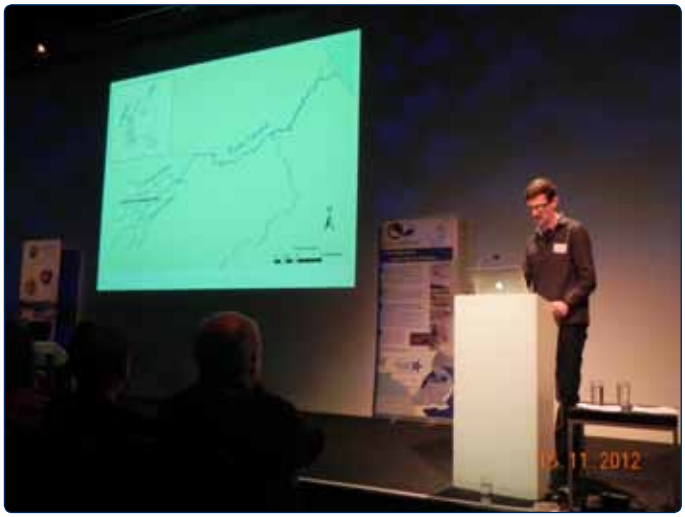
Representatives from The Rivers Trust, Exeter University, Rivers and Fisheries Trusts Scotland, Marine Scotland, Agri-Food and Biosciences Institute Northern Ireland, Danish Technical University, University College Cork, Institute of Marine Research in Bergen, Westcountry Rivers Trust, Bangor University and the University of Aberdeen with Kevin Patterson, Tweedswood head boatman

Living North Sea Study

In May, The Foundation held a Scale Reading Workshop attended by biologists from the Eden Rivers Trust, River Annan Trust and the Wester Ross Fisheries Trust.

Reading Salmon scales is relatively straightforward as Salmon have only a limited range of life history types. Sea-trout and Brown-trout are, however, much more variable in their ways of life - and can spawn many times. Interpretation of the growth patterns on trout scales can therefore be much more difficult. Workshops bringing together people with experience of reading scales from different trout populations are a very useful way of improving and extending expertise.

Delegates consider fish scales and age classification



Niall Gauld, PhD student with The Tweed Foundation and Durham University gives his presentation to the LNS Closing Conference in Newcastle Upon Tyne, November 2012 on tracking smolts on Tweed

2012 saw the close of the Living North Sea study (LNS). LNS has been a consortium of fisheries management bodies from around the North Sea, all of whom have been studying aspects of fish migration over the last three years. The Tweed Foundation's interest was both local and international. The support from the study allowed the Fisheries Management Plan (FMP) work on both juvenile and adult Sea-trout of the Tweed to be extended. New work, comparing and contrasting Tweed Sea-trout with other populations around the North Sea was also supported. Several threads of work were undertaken including collating recorded data of Sea-trout populations around the North Sea, including geographical distributions and fish sizes; in-river analysis of electro-fishing data and scale readings; the use of genetics to distinguish populations; and acoustic tracking of smolts which has highlighted some important impacts of predation on low head weirs. The work on the acoustic tracking of smolts down the Tweed has been written up and a paper on it, [Gauld N.R., Campbell, R.N.B & M.C.Lucas; "*Reduced river flow impacts salmonid smolt emigration in a river with low-head weirs*"] is in preparation and should be published in 2013. These results cannot therefore be given in this report as it would pre-empt publication, but a summary will be given on The Foundation's website once it is published. The total cost of the study has been £321,398 over three years supported by a 50% grant from the EU under the Interreg IVB North Sea Programme.

Relationships with Other Sea-Trout Populations: The first results from looking at the origins of Sea-trout caught in the sea along the coast from the Tweed south became available, and showed that Sea-trout from the Tweed are genetically identifiable in catches made in coastal fisheries outside the region. The complete results of this will be available in 2013 as one of the final reports from the LNS programme and will then be summarised on the Tweed Foundation website.

Ronald Campbell gives his presentation to the LNS Closing Conference in Newcastle Upon Tyne, November 2012

Education

Starting the quiz at The Tweed Foundation's stand at the Border Union Show, July 2012

A young visitor gets her first taste of trout fishing!

To tie in with the Living North Sea study, The Foundation concentrated on the theme of the Life Cycle of Tweed Trout for the Border Union Show stand in July. An imaginative series of displays explained the differences between the life cycle of Brown and Sea-trout. The stand incorporated a children's quiz, which guided them from juvenile fish in the headwaters to the point where the fish "decide" whether to remain in the River as Brown-trout, or follow a life across the ocean as Sea-trout. The Foundation won the Reserve Champion rosette for its stand at this year's Show.

Above: the fish tank is always a draw for younger visitors to the stand

Below: Trout & Grayling Biologist, Kenny Galt, spins the wheel in the children's quiz to see whether he is going to stay in the River as a 'Brownie" or take to the ocean as a Sea-trout

Fish Counters

Rationale: The most basic need of a stock is that enough fish should escape all the pressures on them to spawn and fully seed their nursery areas for the next generation and this is best known if the fish of each species and stock can be counted. (FMP INPUTS 2F, 3F)

Ettrick Counter: With the work being carried out to repair the Murray cauld, the installation of the new fish pass and Archimedes screw turbines, no count was made in 2012.

Gala Counter: The Gala Water counter, situated at the Skinworks Cauld in Galashiels, continues to provide a full count for Salmon and Trout on this tributary. The estimated species totals for Salmon and Trout are shown in the table below. It is important to remember that no more than half of the fish that pass through the counter can be directly identified as Salmon and Trout using their video clips. The remaining fish that are unidentified due to water turbidity are classified as Salmon or Trout using two different assignment methods that take into account the length of each fish and the time of year, both of which influence the frequency of each species and their sizes.

2012 was notable for having the lowest Salmon total recorded since 2008, although the figure of 821 is still 165 in excess of the estimated minimum spawning requirement of 656 fish. One hypothesis for the low total was that this year's run was the first to include fish that had been juveniles during the extreme Spring snow melt flood of April 2010. Fish that were Fry then could have returned as 1.1 Grilse in 2012 whilst those that were 1 year old Parr in 2010 would have returned as 2.1 fish. As the newly emerged Fry were probably impacted more than Parr, and most juveniles smolt at two years old, the biggest impact of this flood should be in 2013 when the 2010 Fry will return as 2.1 Grilse, and in 2014 when they come back as 2.2 Salmon.

The lowest Trout count was also recorded in 2012 but the evidence from electro-fishing surveys is that the Trout Fry of smaller tributaries of the Gala Water were not as strongly affected by the spring flood event in 2010 as Salmon Fry, although Trout Parr in the main channel could have been affected. Further analysis is required to look at the relationship between flow levels of the Gala Water and corresponding fish counter totals. It is possible that high flows in October were a problem as counts of Trout and Salmon were actually within previous ranges in the other autumn months and only severely down in that one month.

Whiteadder Counter: A regular count for the new Whiteadder counter was made up to September. Unfortunately the exceptionally large flood event on September 25th caused damage to the control box on the counter and this took a number of weeks to repair. The protective cage around the counter did however prevent more serious damage and improvements are planned in 2013 to provide further protection from large flood events.

Gala Counter Totals

Year	Salmon	Trout	Total	Salmon %	Trout %	Salmon Surplus
2008	1954	2273 (345)	4227	45	55	1298
2009	1063	1889 (377)	2952	36	64	407
2010	1361	1362 (232)	2723	50	50	705
2011	1481	2354 (559)	3835	39	61	825
2012	821	1361 (239)	2182	38	62	165

Corrected annual totals. Salmon surplus = number of Salmon minus spawning target of 656 fish (at egg deposition rate of 500 eggs / 100 m2). Figure in brackets is for Trout under 40 cm (included in Trout total), the majority of which are assumed to be Brown Trout.

The Gala cauld and fish counter (on the far side) in a flood on 12th October 2012

Sea-trout passing through the Whiteadder fish counter

Tweed Trout & Grayling Initiative

Rationale: Determining and defining the stocks of Brown-trout within the Tweed system and their life histories, including investigation of growth patterns and size ranges, and establishing the structure of trout spawning populations on a representative sample of burns. Creating an inventory of the quantity and quality of habitat for Brown-trout, and collection of data on, and analysis of, trends in rod catches. Estimation of exploitation rates and monitoring of adult Brown-trout populations trends and characteristics. (FMP INPUTS 4A.2, 4A.4, 4B.3, 4D.2, 4F.1)

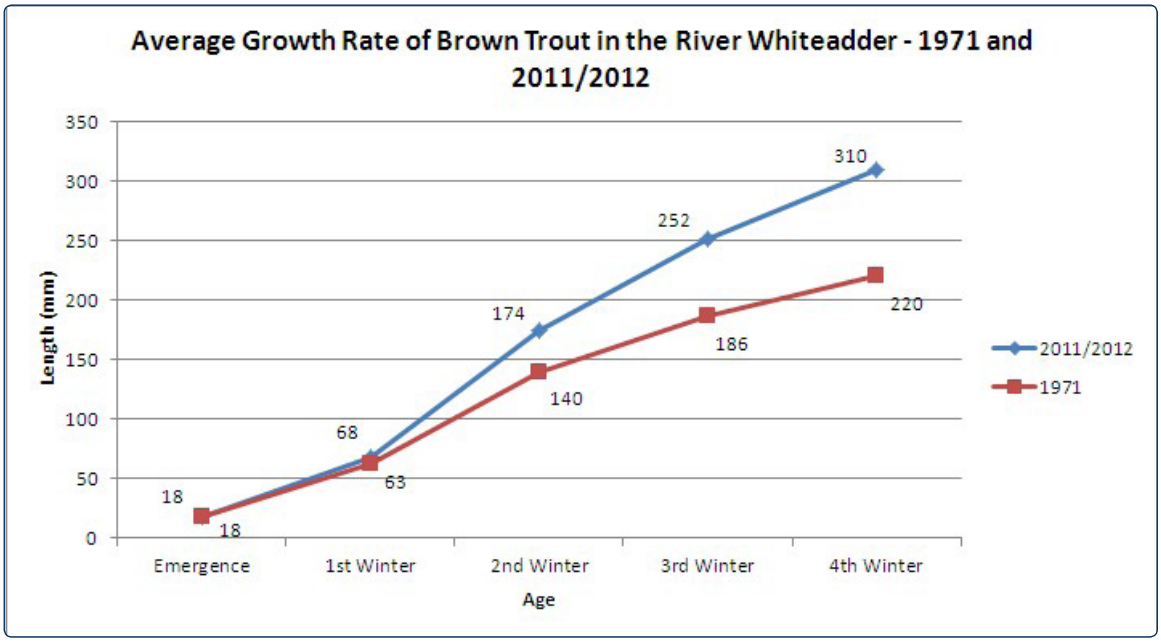
The Tweed Trout & Grayling Initiative (TTGI) is also involved in several other sections of the Fisheries Management Plan (FMP), reported on elsewhere in this document.

Scale from a 27cms, two-year-old Brown-trout from the Whiteadder

Growth Patterns: Whilst attempts are made to collect Brown-trout scale samples from all parts of the Tweed catchment particular effort has been put into collecting scales from the Whiteadder during 2011 and 2012 (there being several volunteers available to help do this). Over the two years, a total of 202 scale samples has been collected from trout varying from 11cm to 63cm in length (a few ounces to 5½ - 6lbs), and for all months during the trout season. As a result it is now possible to determine the ages of different sized Whiteadder trout and their growth and variation throughout the fishing season. It is also now possible to determine the contribution of each year class of trout to the Whiteadder rod catches, as shown in the catch log books, for each month of the season. Adding to these findings it has been possible to compare the present day growth rates to those in the early 1970's as a similar study in 1971 was carried out by Mills ***et al.*** (1972). It is clear from this that today's trout are growing far faster than their predecessors in the 1970's. This is most likely as a result of the warming climate, as the same trend has been seen in Salmon Parr.

Structure of Spawning Populations: The analysis of the Carbon and Nitrogen isotope levels in trout fry was completed and a paper has been published in the journal *"Ecology of Freshwater Fish"* [R. A. Briers, J. O. Waterman, K. Galt and R. N. B. Campbell, 2013: *Population differentiation and temporal changes of carotenoid pigments and stable isotope ratios of anadromous and non-anadromous trout Salmo trutta*]. A summary of this is given on The Tweed Foundation website.

As this work has shown it is possible to determine whether a trout Fry originated from an egg grown in a Sea-trout at sea or in a Brown-trout in freshwater, the aim is now to map the origin of trout Fry in two areas: the Gala Water (where the fish counter gives the total number and the sizes of trout entering it), and the Upper Tweed (where at least one "pure" Brown-trout population is known to exist from trapping). Financial support for this work is coming from both the Atlantic Salmon Trust and the Wild Trout Trust.



This work will help us better understand the trout production in the Tweed and its relation to Brown-trout angling. Studies of the spawning populations of some Tweed burns have shown that burns where the mothers are Brown-trout produce mainly (or possibly only) Brown-trout which have a tendency towards being long lived and late maturing (with some reaching considerable size). Burns where the mothers are Sea-trout still produce Brown-trout - although these will tend to be mostly males, with most females and a smaller percentage of the males heading off to sea. In addition, the Brown-trout from these burns seem to be earlier maturing and generally shorter lived with only the very occasional one attaining specimen size.

The Drumelzier Burn in Upper Tweed, one of those sampled in 2012

Obstacles to Fish Passage: As part of the long-term Forest Planning process, forestry managers have to consult with other interests, such as fisheries. This provides the opportunity to bring access problems in streams within plantations to their attention and, as The Foundation has now built up a large database of problem culverts and other instream obstacles, replies to these consultations can give data on where fish passage in streams can be improved. So far, all the sites brought to the attention of forestry managers in this way have been accepted as issues to be dealt with. Consultations responded to in 2012 were for the Cockiland, Hearthstanes & Polmood (upper Tweed); Jeffrey Cleuch; Netherphawhope (Ettrick); Lauderdale Estates (Leader); Stonedge & Howahill (Teviot) plantations.

Trout fry in a trout spawning burn

Catch Composition: As with the previous six seasons, Brown-trout catch log books were handed out with season tickets for most Tweed Angling Associations in 2012. A total of 70 have been returned to date, covering 585 fishing trips and 1,628 hours of fishing effort.

Brown-trout catch rates in 2012 for the various areas of the Tweed were generally around or above the averages for the previous six years, with only the middle Tweed showing catches that were below average. However, middle Tweed catches over the last six years had been showing an upwards trend until this point.

John Mclennan with a 63 cms trout caught at Boleside, April 2012

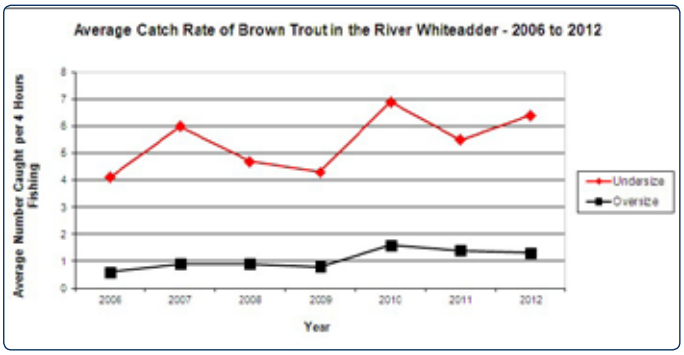
For the rest of the Tweed system, with one exception, there have been no obvious trends in catch rates over the last seven years and catches are mostly stable or slowly improving. The exception is on the lower Tweed where catches were more variable; the catch rates did, however, increase in 2012 and were slightly above their average, albeit of smaller than normal trout. The lower Tweed is known for its catches of trout over 12" but the 2012 increase in trout catches was mostly of trout between 10" and 12".

Catch reports for different parts of the Tweed catchment were distributed with the Angling Associations' season tickets in March/April 2012. They can also be found on The Tweed Foundation's website.

Tweed Trout & Grayling Initiative

Spawning Escapement Targets: Due to gravel build up behind it, the Stanhope trap was left with its sluice open this winter, which should let gravel flush out. In the future, to prevent such build ups, it will be left open every third year or so.

The temporary trap at the bottom of the Myre Burn (on the Ale Water near Bewlie) was again run in 2012 by a volunteer from the Hawick Angling Club. The trap is used to establish the "type" or "behaviour" of the trout spawning population in the burn. The results for 2012 were slightly below average (although there were two occasions where the trap was "washed out" by high flows in which fish would have been able to pass without capture). However the results were still good enough to reinforce data collected in previous years and give greater confidence that the type of spawning run has been correctly identified. In particular the scale samples collected from trout in 2012, when added to previous years' scales, allowed very accurate ageing of the spawning population, a very important part of understanding the whole picture.



The Bewlie trout trap after a large flood in November 2012

A male Brown-trout

The Isotopes work (see page 16) should now provide a different way of determining whether a burn is being spawned in by Sea-trout or Brown-trout females and should therefore replace the temporary trapping which has been, up till now, the only way of finding out what fish were using a burn. As a much quicker and more flexible method, it should be possible to categorise many more burns in the future.

A 42cms Grayling. Catches of Grayling of this size were below average in 2012

Grayling

Grayling catch records are a vital source of information on Tweed Grayling. The three main sources of catch returns are the Trout Catch Log Books (where Grayling are also recorded), winter Grayling catch log books, and Catch & Release fishing competitions. Competition results (the most reliable source of data) for 2012 recorded below average Grayling catches for all sizes of Grayling. However, in contrast, reports for December 2012 were very good with large numbers of 25-35cm (1 year old Grayling) being caught. The Earlston Grayling competition was held in early January 2013 and provided large amounts of catch data which was used to confirm these early conclusions. (The results of the competition are summarised on the Tweed Foundation website.)

TweedStart

TweedStart at The Roxburghe Fishery. A day specifically for adults to come and try fly fishing was held in September

TweedStart is run by Eoin Fairgrieve for The Tweed Foundation. During 2012 TweedStart continued to work closely with local primary and secondary schools in the Scottish Borders and North Northumberland to introduce children to fishing and promote the positive impact that angling practice has on the environment as well as the local economy.

TweedStart days this year also included a day specifically for adults to come along and try their hand at fly fishing. 16 people attended on a gloriously sunny and warm Saturday in September and were provided with expert advice from the six instructors on hand to help with casting tuition, fly tying and entomology queries, as well as advising on buying a rod and where to go to take their taste for fly fishing further.

In addition to the usual schools' days held at The Roxburghe Ponds, local events in the region were again attended in 2012 to help promote and encourage children to take up fishing including: an 'Introduction to Fishing' day at Kailzie Fishery near Peebles in conjunction with, and funded by, the Peeblesshire Trout Fishing Association, and attendance at the annual Border Union Show at Springwood Park, Kelso in conjunction with The Tweed Foundation.

Once again, TweedStart was present as part of the Massed Pipe Band day at Floors Castle at the end of August, running the fly casting area at which over 80 children took part.

TweedStart at The Roxburghe Fishery

- 17 TweedStart Days held in 2012, comprising:
  - 14 TweedStart Days at The Roxburghe Fishery for 302 Children and 1 day for 16 Adults
  - 2 Outside events attracting 120 Children

Experience a TweedStart Day on Film
Search for
'TweedStart'
on
www.youtube.com

TweedStart Budget 2012:

Income (all from Donations)	**£ 6,655**
Expenditure (Instructors, Equipment Hire & Service, Stock Trout for the ponds)	**£ 10,926**

TweedStart and The Tweed Foundation are most grateful to all organisations and individuals that made donations towards the cost of running this initiative

Casting instruction at the TweedStart adults' day

The Tweed Foundation Limited

(A charitable company limited by guarantee)

Statement of Financial Activities

For the year ended 31 December 2012

	Unrestricted Funds £	Restricted Funds £	2012 Total £	[restated] 2011 Total £
Incoming resources				
Incoming resources from generating funds:				
Voluntary income	173,328	-	173,328	176,714
Investment income	12,106	-	12,106	12,994
Incoming resources from charitable activities	37,127	65,787	102,914	122,436
Other incoming resources	-	-	-	365
Total incoming resources	**222,561**	**65,787**	**288,348**	**312,509**
Resources expended				
Costs of generation funds:				
Cost of generating voluntary income	5,500	6	5,506	3,543
Investment management costs	857	-	857	460
Charitable activities	227,526	57,642	285,168	306,956
Total resources expended	**233,883**	**57,648**	**291,531**	**310,959**
Net incoming/(outgoing) resources for the year	(11,322)	8,139	(3,183)	1,550
Realised gains/(Losses) on disposal of investment assets	(1,067)	-	(1,067)	53,172
Net Income/(Expenditure) for the year	**(12,389)**	**8,139**	**(4,250)**	**54,722**
Other recognised gains and losses				
Gains/(Losses) on revaluation of investment assets	30,938	-	30,938	(81,619)
Net movement in funds	**18,549**	**8,139**	**26,688**	**(26,897)**
Total funds brought forward	582,684	7,969	590,653	624,422
Prior year adjustment	-	6,873	6,873	-
Restated total funds brought forward	582,684	14,842	597,526	624,422
Total funds carried forward	**601,233**	**22,981**	**624,214**	**597,525**

Extract from the 2012 Accounts

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

Further financial information can be found on The Tweed Foundation's website at **www.tweedfoundation.org.uk**

Copies of the full audited accounts are available upon request.

Trustees & Staff

As at May 2013

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

Douglas J Dobie (Chairman)
J C (Ian) Currie
Lord Joicey
Jennifer J Lovett (Treasurer)
Richard J Onslow
The Duke of Roxburghe
John P H Scott
The Duchess of Sutherland
W Allan Virtue
Professor Roger J Wheater
Douglas H Younger

Foundation Staff

Nicholas P Yonge (Director)
Dr Ronald N B Campbell (Biologist)
Fay B L Hieatt (Company Secretary /Administrator)
James H Hunt (Assistant Biologist)
Kenneth A Galt (Trout & Grayling Biologist)

Principal Bankers

The Royal Bank of Scotland plc
6 The Square, Kelso, Roxburghshire, TD5 7HG

Auditors

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

Fund Managers

Cazenove Capital Management Limited
Edinburgh Quay, 133 Fountainbridge, Edinburgh, EH3 9QG

Acknowledgements

The Tweed Foundation's work is part-financed by:

Living North Sea

The Interreg IVB North Sea Region Programme
Investing in the future by working together for a sustainable and competitive region

~RTC~

In the middle of 2009, The Tweed Foundation began a major new study on Tweed's Sea-trout stocks, under the title "Living North Sea". This is a pan-northern European project comprising 11 other scientific research partners from Scotland, England, Belgium, The Netherlands, Germany, Norway, Sweden and Denmark. With these partners to the programme, it is hoped to identify the mixed-stock fisheries around the southern North Sea that exploit Tweed Sea-trout as well as confirm and extend knowledge of the marine feeding grounds that they utilise. The long-term aim of the Living North Seas work is to set up a North Sea Sea-trout group that can oversee the management of the species in the North Sea. The netting and tagging work currently carried out at Paxton netting station forms part of the Tweed Foundation's study within the "Living North Sea" project, as does its tagging work with smolts, scale reading of Sea-trout scales, and electro-fishing studies.

In addition, The Tweed Foundation is very grateful to Tweed fishery proprietors, the local Angling Associations, and many others for their financial assistance with our studies.

Visit the Tweed websites

www.tweedfoundation.org.uk

Information, reports, the Tweed Fisheries Management Plan, seminar alerts, auction brochures and scientific papers on The Tweed Foundation's work.

www.ttgi.org.uk

Information relating to the Tweed Trout & Grayling Initiative (TTGI). Newsletters, current studies being undertaken, Log Book downloads and more.

www.tweedstart.org.uk

Information on the TweedStart project - introducing all ages and social backgrounds (with a special emphasis on children and young people) to fly fishing, entomology and general river conservation on Tweed.

www.rtc.org.uk

The River Tweed Commission's website. Features Angling Codes, Annual Reports and other legislative information relating to the River.

www.rivertweed.org.uk

Features all types of News pieces from the River Tweed, information/advice, and a biology Blog.

Tweedline

Tweedline telephone numbers:

Daily River Levels **09060 400 411**

Calls cost £1.53 per minute from a BT Landline (other network and mobile costs may vary).
Profits from your call will go to the Tweed Foundation in support of its work to help preserve Tweed fish stocks.
Service provided by the Tweed Foundation at Drygrange Steading, Melrose, Roxburghshire, TD6 9DJ.

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:

☐ Ordinary Annual Friendship	£ 15
☐ Joint Annual Friendship	£ 23
☐ Ordinary Life Friendship	£ 250
☐ 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 83-23-18, Account No. 00275893)
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

Donations & Gift Aid

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
The Royal Bank of Scotland plc
7 The Square, Kelso, TD5 7HG

Account No: 00275893 Sort Code: 83-23-18

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

On the _____ (day)

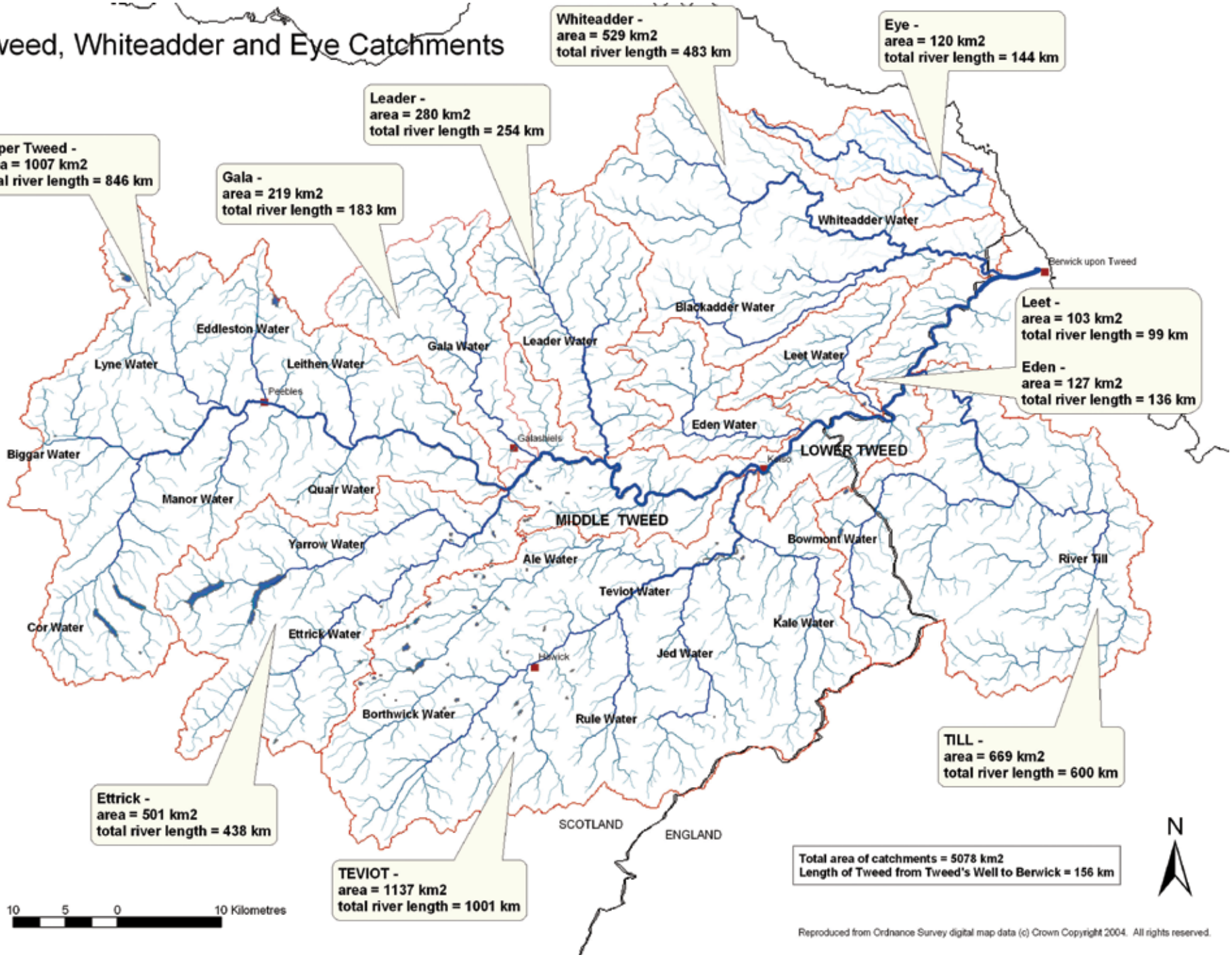
of _____ (month)

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

The Tweed, Whiteadder and Eye Catchments



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