KYLE OF SUTHERLAND FISHERIES

Kyle of Sutherland District Salmon Fishery Board
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Kyle of Sutherland Fisheries

Annual Report Contents

Kyle of Sutherland Fisheries Trust

Chairman	Richard Sankey
Trustees	Michael Brown John Green Steven Mackenzie (River Workers Representative) Robbie Douglas Miller Ashe Windham

Kyle of Sutherland District Salmon Fisheries Board

Chairman	Richard Sankey, Upper Oykel
Proprietors	John Green, Lower Oykel Nicky Griffiths, Braelangwell Estate Gary Gruber, Skibo Estate Rob Whitson, Mandatory Glencassley Estate Alex Hunter, Dounie Estate Robbie Douglas Miller, Upper & Lower Shin William Paterson, Netsman
Co-optees	Peter Routledge, Kyle of Sutherland Angling Association Ashe Windham, Upper Oykel
Clerk	Dr Keith Williams
Staff	Dr Keith Williams, Director Jacqui Hamblin, Administrator John Audsley, Bailiff Supervisor Sean Robertson, Science & Mitigation Officer Iain Gollan, Bailiff Philip Blowers, Bailiff

Chairman's Foreword

The prolonged drought during much of 2018 was one of the longest recorded, with no meaningful rain from the end of April through until the second week of August. I had to go back to 1954 to find a similar dry period. By contrast the infamous drought of 1976 delivered more rain during the summer months than in 2018. Despite the lack of fishing opportunities during much of the season it is encouraging to discover that the KOS rod catch ended up at 2914, mostly helped by good fishing conditions in April and also again at the end of the season. By contrast the years' of 1954 and 1976 produced rod catches of only 1031 and 1273 respectively. This should however be seen in the context of the nets taking approximately 9000 fish in each of these years. With the coastal and estuarine nets no longer in operation the benefits to the regions salmon is clearly apparent. However, the loss in numbers from the net fishery goes someway in demonstrating the level of decline in salmon stocks overall.

These are difficult times for salmon in Scotland and beyond; yet compared to many other regions we appear to be fairing much better than most. This does not mean we can afford to be in any way complacent, instead we must do all we can to help our fish stocks to thrive.

The year saw an increase in project and mitigation activity, all of which helped to increase our knowledge and understanding about the fishery and the various factors that influence survival. It is of course through good scientific evidence that we can best influence future management practice. Both the KSDSFB and the KSFT are in a strong position going forward and I am pleased to report that there are number of significant projects planned for 2019 and beyond, all of which are focused on protecting and enhancing the regions fish stocks.

Kyle Fisheries is extremely fortunate to have an excellent staff team carrying out an array of statutory and non-statutory work. I would like to take this opportunity to thank all our staff for their very hard work, professionalism and commitment.

Richard Sankey (Chairman)
Kyle of Sutherland District Salmon Fishery Board
Kyle of Sutherland Fishery Trust

April 2019

Director's Foreword

Once again 2018 can be characterised as being a very busy year. Work to transport and monitor smolts was at the core of the work undertaken in the spring months and the new working arrangements with SSE was a success. We were joined in February by Sean Robertson, our Science and Mitigation Officer. Sean has taken to his role with gusto and has greatly increased the capacity of the organisation to undertake science-based project and mitigation work. The summary he produced of his activities for this annual report highlights the diverse range of tasks he undertook during his first field season with us. Additionally, Sean has taken on many tasks associated with better communicating the work of Kyle Fisheries to the outside world. This has been done largely of his own volition.

Considerable effort and financial resources were expended on upgrading the website. Jacqui Hamblin was largely responsible for collating the material on the website and coordinating with Cheryl Hopkins, the website developer. I hope that the new site now represents an excellent portal for all things fish related in the Kyle of Sutherland district. A conscious decision was taken to include more material on individual fisheries within the area. These fisheries form a vital component of the overall economic activity in this area.

The dry period in the summer stretched enforcement resources due to salmon congregating in the Kyle and at various falls on the rivers. The bailiffs responded with typical dedication and protected the fish from illegal activity as much as possible until the welcome rainfall in September allowed the fish to migrate as normal. Their continued flexibility in both working hours and the types of task undertaken is much appreciated by the rest of the staff and is not taken for granted. John Audsley undertook the IFM Certificate course during the year and is to be congratulated for successfully passing the exams.

Finally, I would like to thank all the members of the fishery board and the trustees who give their time voluntarily to ensure the smooth running of both organisations. In particular, the members of the joint management group are a constant source of support and encouragement.

Keith Williams (Director)
Kyle of Sutherland District Salmon Fishery Board
Kyle of Sutherland Fishery Trust

April 2019

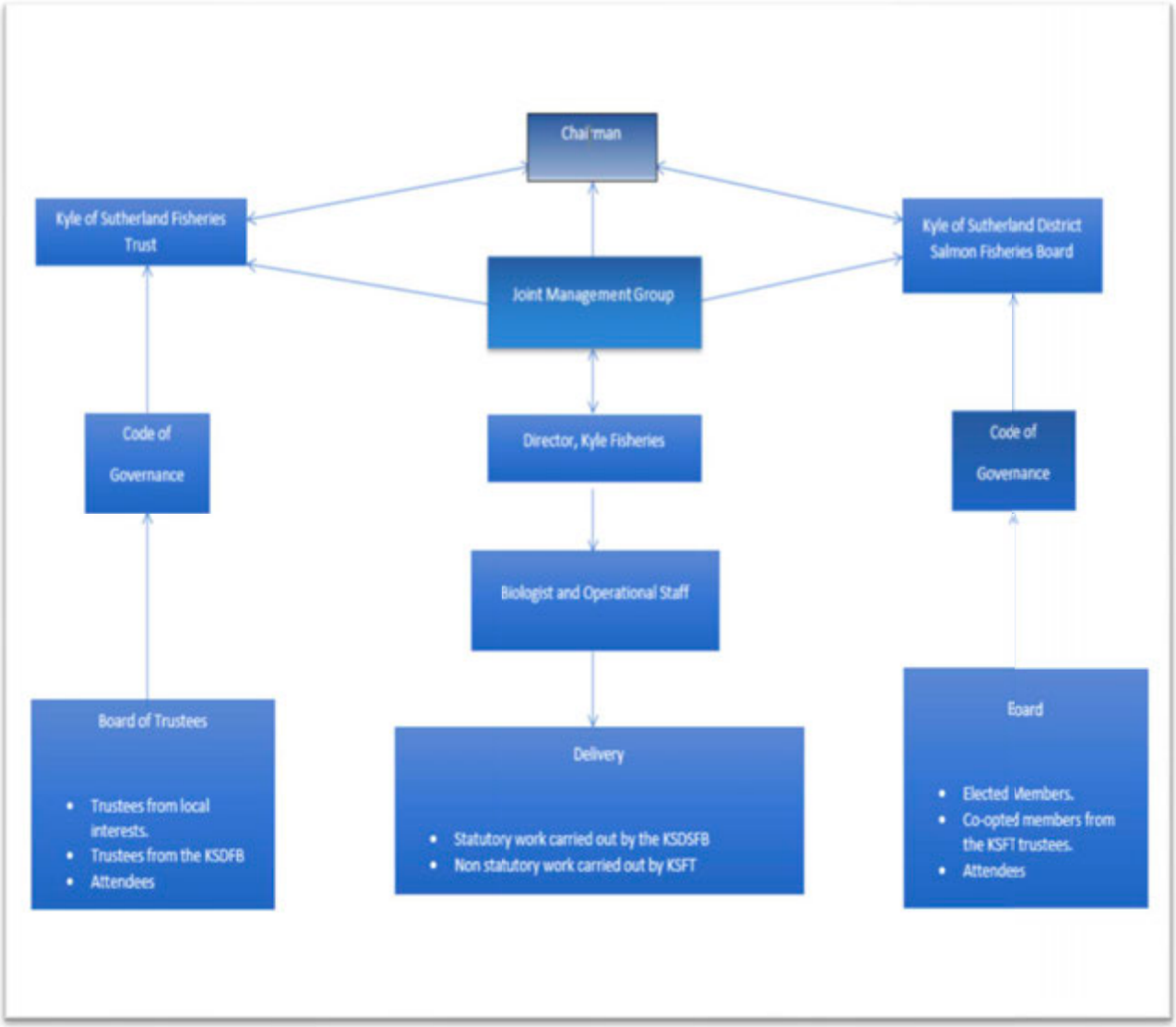
Kyle of Sutherland Fisheries Structure

Kyle of Sutherland Fisheries represents two organisations that work closely together.

The Kyle of Sutherland District Salmon Fishery Board was initially established in the 1860's and has a remit defined by statute. The remit extends to salmon and sea trout only. The original legislation has been amended on various occasions culminating in the Aquaculture and Fisheries (Scotland) Act 2013.

The Kyle of Sutherland Fisheries Trust is a registered charity and a company limited by guarantee with incorporation commencing in 2000. The Trust has a much broader remit than the Board with its sphere of operation encompassing all species of fish and the aquatic environment in general.

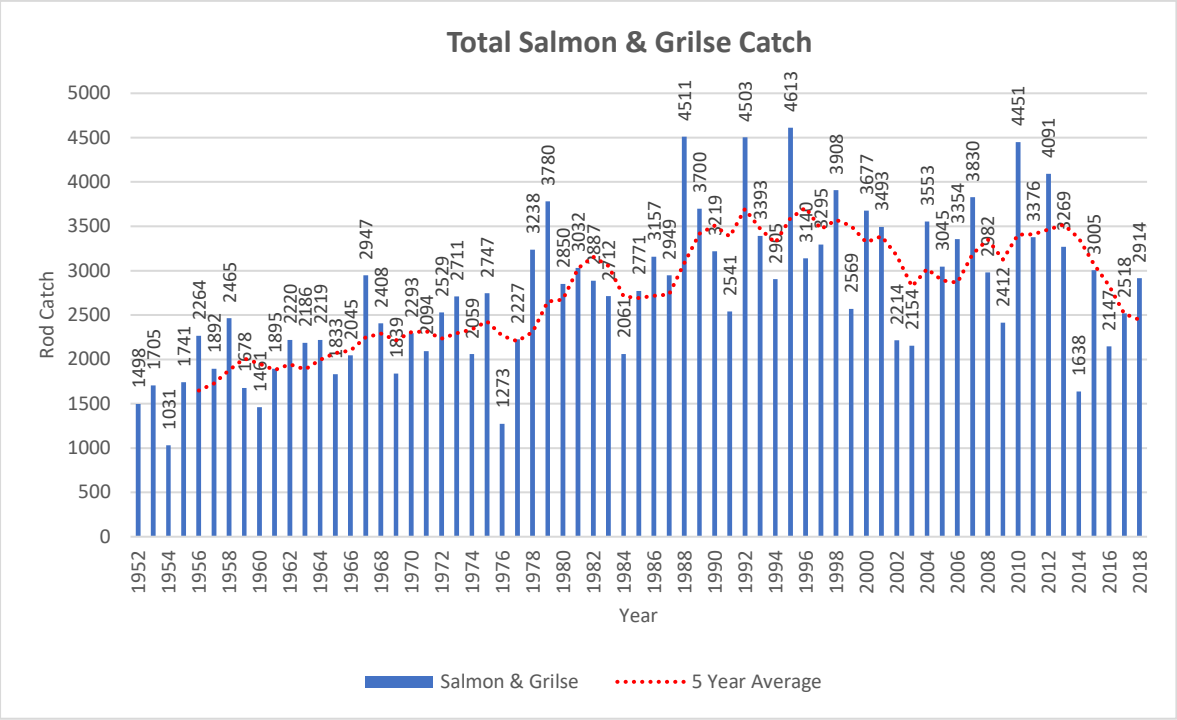
The structure of the operation of Kyle Fisheries is explained in the following diagram.



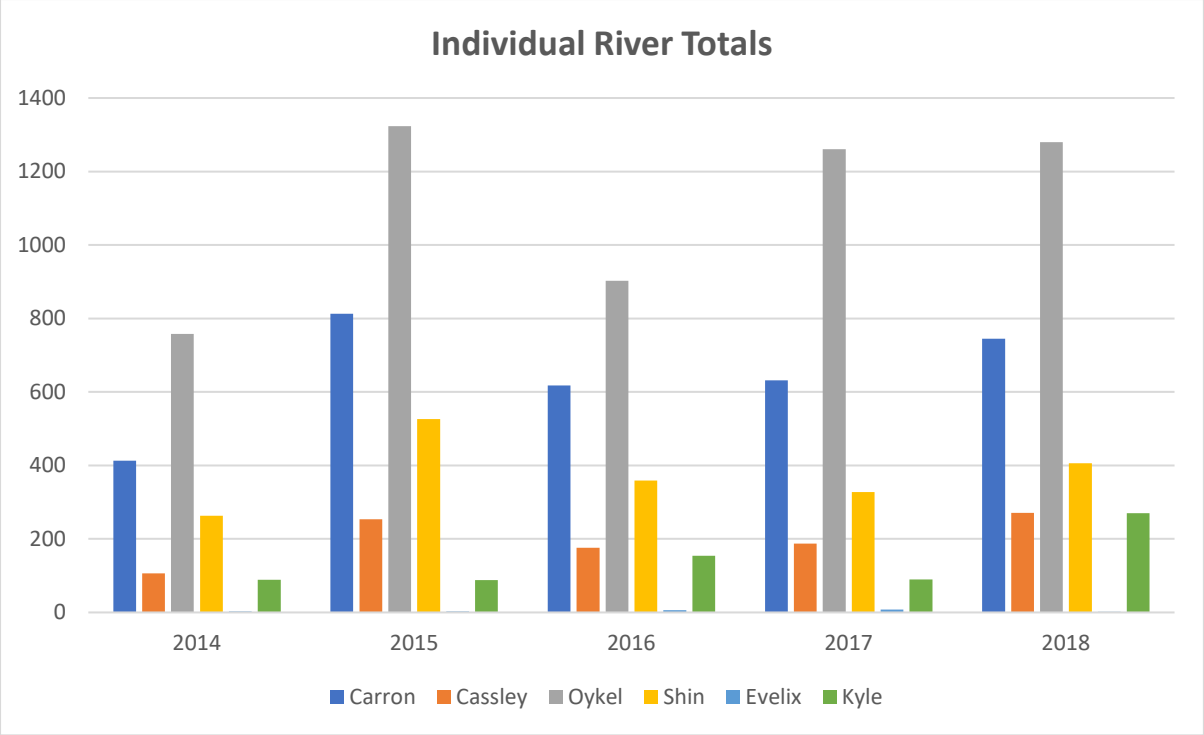
Kyle of Sutherland District Salmon Fisheries Board

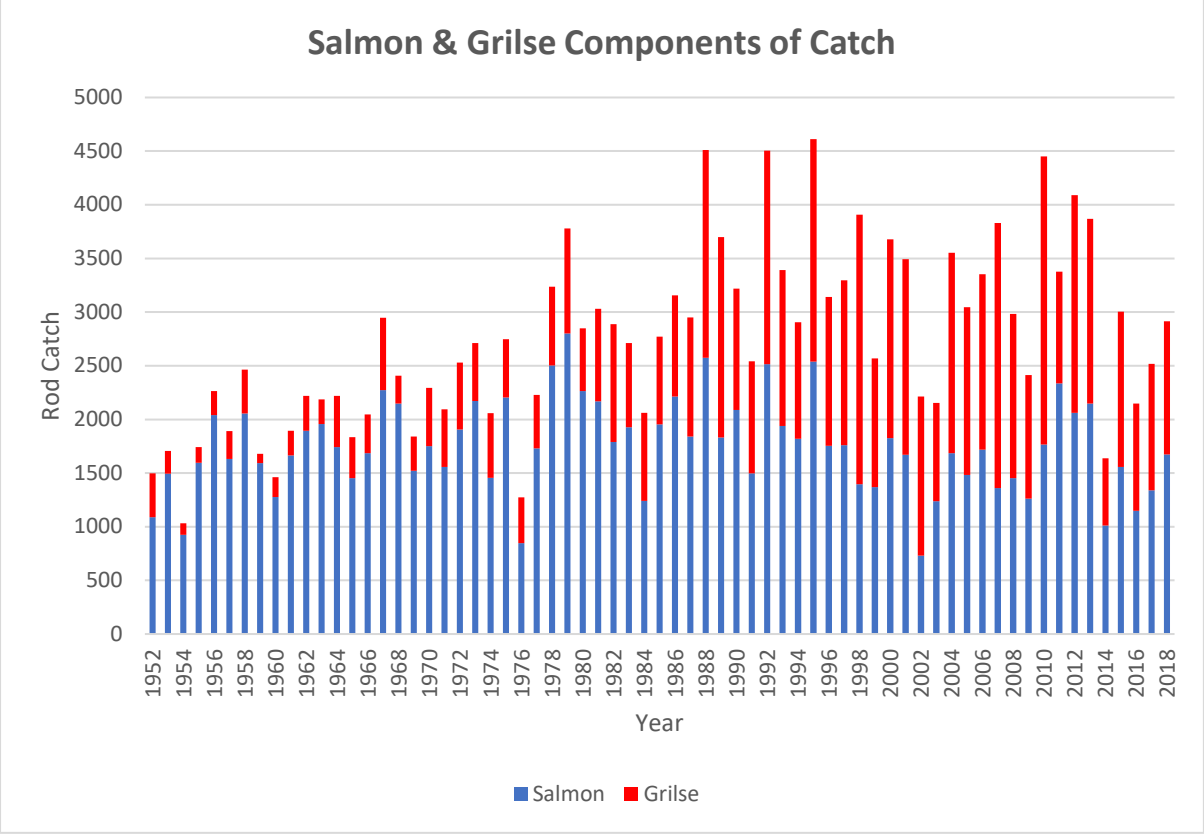
1.1 Fishery Performance

Salmon rod catch in 2018 increased on the 2017 figures despite the extended dry period in the summer months. Provisional proprietor catch data submitted to the Board suggests a total grilse and salmon catch of 2,914 for the season compared to a Marine Scotland figure of 2,518 in 2017, an increase of 16%. The total catch is 8% above the mean figure for the 1952-2017 Marine Scotland catch data and 16% above the five year (2013-2017) mean of 2,515 The graphs below place the provisional 2018 data collected by the Board within the historical context of the Marine Scotland Science dataset of catches from 1952-2017. The data used in the following graphs are Crown copyright, used with the permission of MSS, who are not responsible for interpretation of these data by third parties.



A feature of the 1952-2017 rod catch data set is that salmon catches appear to have been relatively consistent whereas grilse catches have been far more variable. Presently, grilse catches appear less prolific than was generally the case some earlier periods but even in the 1980's and 1990's grilse catches appeared to be subject to considerable annual variation.


Individual River Totals
1400
1200
1000
800
600
400
200
0
2014
2015
2016
2017
2018
Carron
Cassley
Oykel
Shin
Evelix
Kyle


Salmon & Grilse Components of Catch
Rod Catch
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
Year
Salmon
Grilse

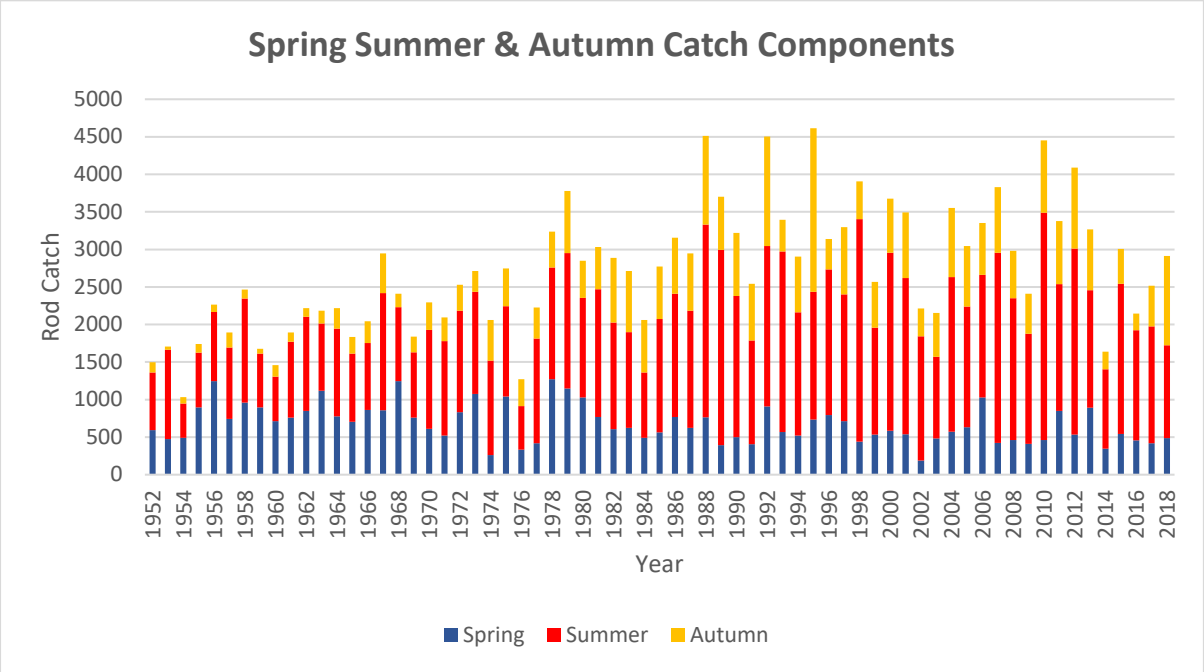
In order to assess if any statistically significant downward trends are detectable in the components of the catch the North Atlantic Salmon Conservation Organisation rod catch tool is utilised. This tool looks at the spring (January-May) summer (June-August) and autumn (September) components of the catch over a twenty-year period. Catches are ranked and scrutinised to answer the following questions:

1) Identify the lowest value. Is it also the most recent value over the twenty-year period?

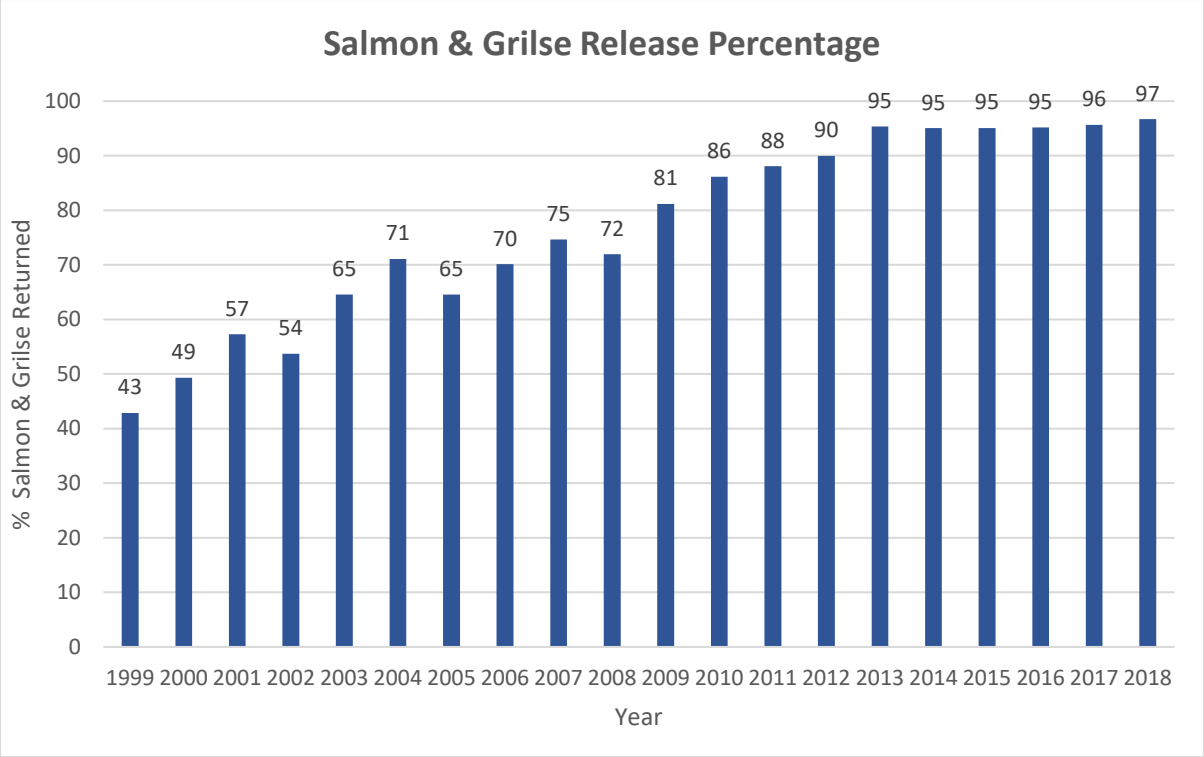
2) Identify the lowest three values. Are two or more of these values found in the last three years?

3) Identify the lowest six values. Are four or more of these values found in the last six years?

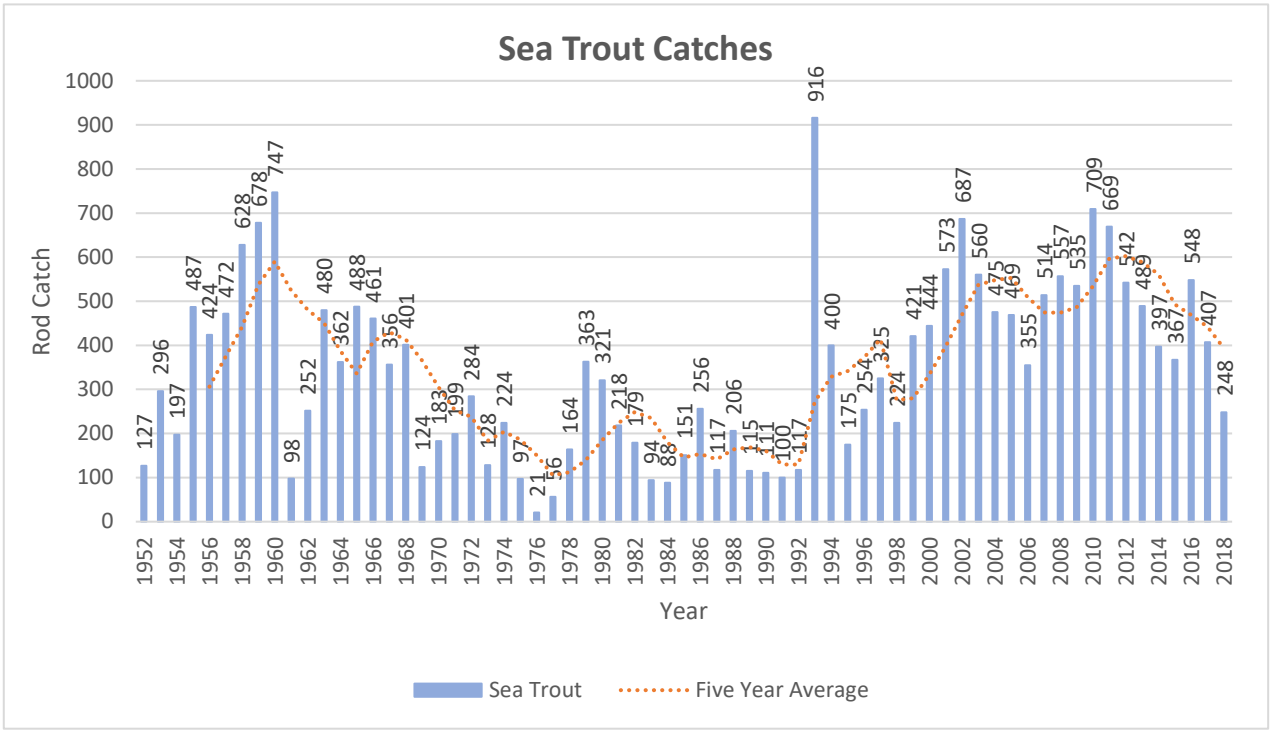
In 2018 the answer to each of the three questions for the district as a whole is negative for the spring and summer components. However, the autumn stock component failed the assessment as four of the lowest values in the twenty-year data set have occurred in the last six years. This is despite the 2018 catch being the highest in the time series. In 2016 the autumn component failed the assessment and in response amendments were made to the voluntary conservation code recommending that all salmon and grilse caught in September were released. The situation remains under periodic review.

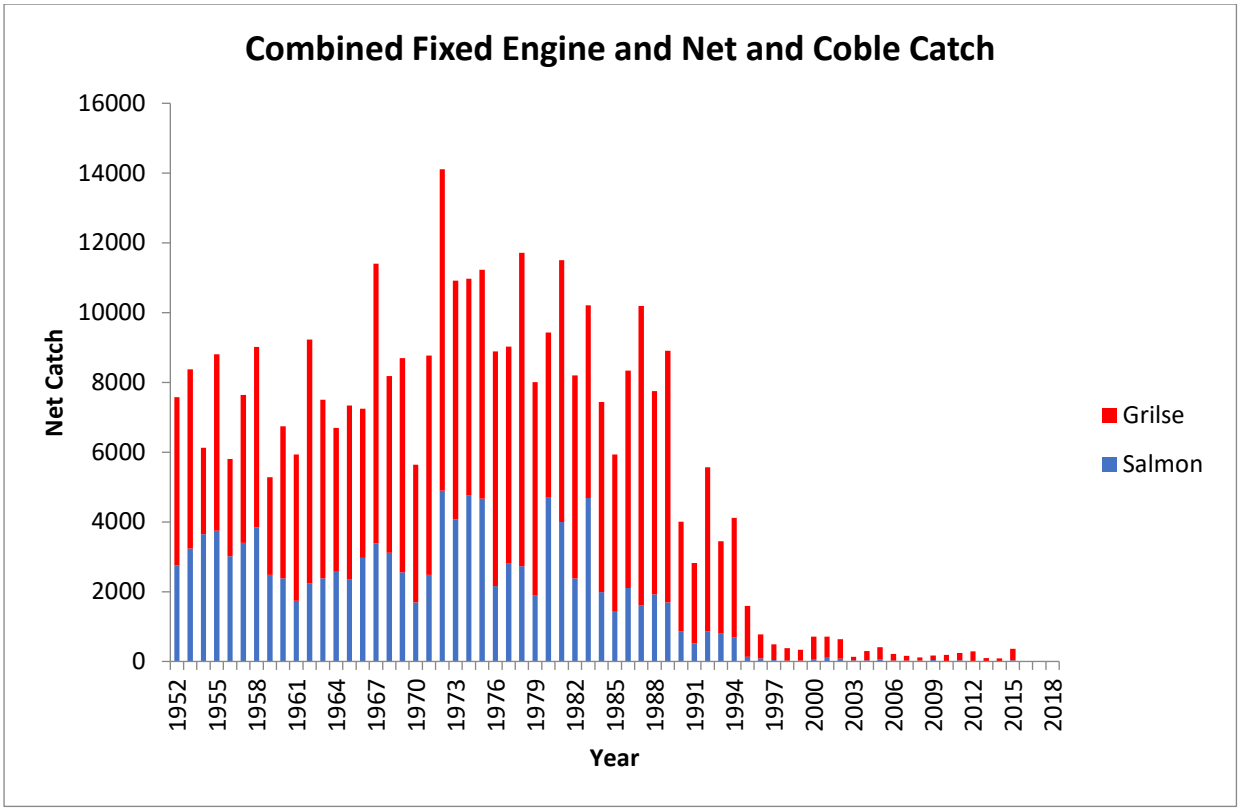


Adherence to the voluntary conservation code remains consistently good with the 2018 release percentage of 97% being the highest in the time series.



Sea trout returns from proprietors in 2018 were again disappointing, declining for the third year in succession. The graph below places the provisional 2018 data collected by the Board within the historical context of the Marine Scotland Science dataset of catches from 1952-2017.




Combined Fixed Engine and Net and Coble Catch
Net Catch
16000
14000
12000
10000
8000
6000
4000
2000
0
1952
1955
1958
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018
Year
Grilse
Salmon

1.2 Enforcement

Once fresh fish arrived in February and March patrols were quickly increased. Patrols took place during both day and night periods. Regular patrols of coastal areas were also undertaken using the RIB. The long period of cold weather in the spring meant that fish were often concentrated into relatively small sections of the rivers, but good intelligence from ghillies meant that various surveillance techniques could be employed in order to protect the fish.

In late spring a box smolt trap was deployed in the upper reaches of the Cassley. Checking the trap was incorporated into the bailiffing routine for a short period with the trap being checked each night. Smolts were weighed, measured and released downstream of the trap. This data was collected primarily to assess what kind and size of tracking device could potentially be suitable for any future tracking project. The size profile of smolts would appear similar to that of Loch Shin tributaries.

The summer months were hot and dry. Water levels dropped keeping the fish in the Kyle and in certain pools in the rivers. With the help of seasonal bailiff Eoghann Gollan, canoe patrols of the Kyle were a regular part of the night surveillance as were foot patrols of vulnerable parts of the rivers. One gill net was recovered from the River Shin - it was an old damaged net and had not been set for some time but nonetheless could still have caused damage.

A number of warnings were issued by the bailiffs for rod and line offences with the police also called on one occasion. No further action was taken. A visit was also made to a local hotel that was advertising line caught salmon on the menu. It transpired that the wording of the menu was incorrect and the offending statement was removed.

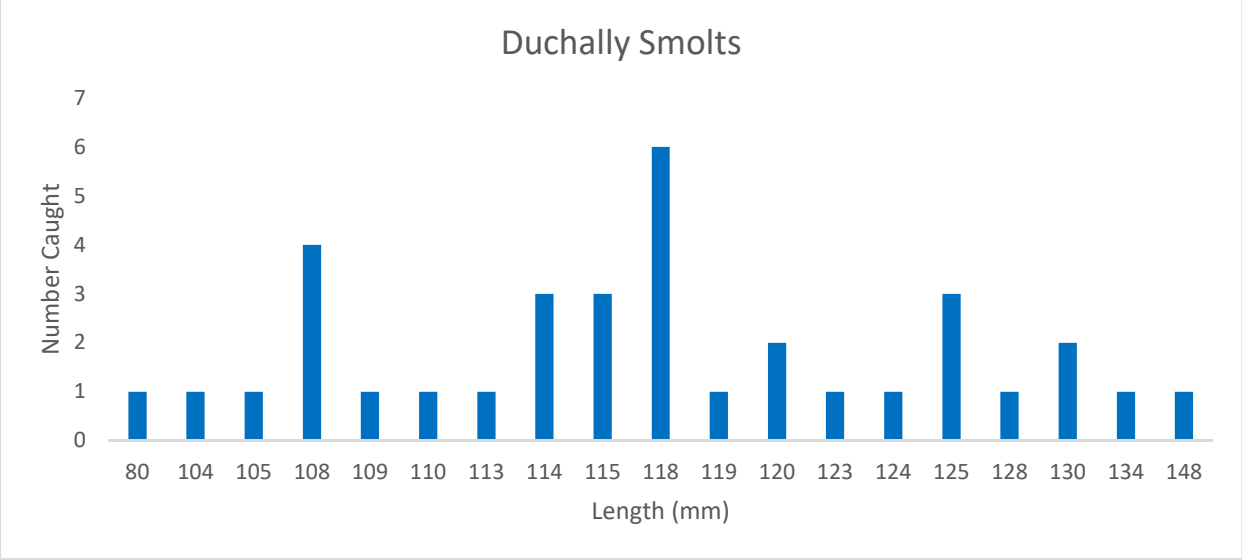


Figure 1. Length frequency of smolts caught in a box trap at Duchally in 2018.

Although the hatchery is presently not in operation regular checks and maintenance work is still being carried out.

John Audsley, Enforcement Supervisor

1.3 Science & Mitigation Officers Report

2018 was my first year working in the Kyle of Sutherland District, after having spent 5 years at the University training for an undergraduate and subsequently a master's degree and working seasonally at the Spey Fishery Board in 2017.

PIT tagging and transportation of smolts was undertaken in the Shin catchment with SSE again. 2018 saw the second highest number of smolts on the river Fiag at 4300, whereas 1500 on the river Tirry. Mark-recapture trials again showed the Fiag trap to be ~60-70% efficient while the Tirry trap efficiency

was comparable with previous years at ~20% despite new instream modifications to the trap site. In 2019 SSE intends to trial a "chain curtain" to further funnel the smolts into the Tirry trap, and discussions with SEPA indicate a move to "best available technology" if this technique fails.

We participated in Marine Scotland's "National Electrofishing Programme for Scotland" in 2018 – the goal of which was to investigate the feasibility of incorporating data from juvenile electrofishing surveys into deciding the conservation status of rivers alongside the rod catch tool. A report is due to be produced in March of 2019 once Marine Scotland have run the model and examined the outputs. In addition to the electrofishing, genetic sampling of Atlantic Salmon parr was undertaken at a national scale. This information will be used for an introgression project to examine whether the genetics of wild salmon have changed due to interactions with farmed escapees. This project will also utilize separate samples undertaken for the purpose of examining introgression in the vicinity of smolt rearing sites. The results from this genetic analysis are expected to be produced in March also, likely put out with the electrofishing results.

The Carron temperature network experienced some problems, due to data recorders not wiping previous data when downloaded. This is an issue Marine Scotland have also faced with some of their loggers. However, the problem has been identified and all the loggers have been cleared properly. An analysis of the data will be taking place in due course. New loggers which can be downloaded via Bluetooth on a smartphone may be trialed, as this would be more accessible for river workers. It is also possible to passcode protect the loggers, and to share the data once it's been downloaded.

The Fishery Management Plan was also updated for the next 3 years and provides a structure as to the work of both the Board and the Trust.

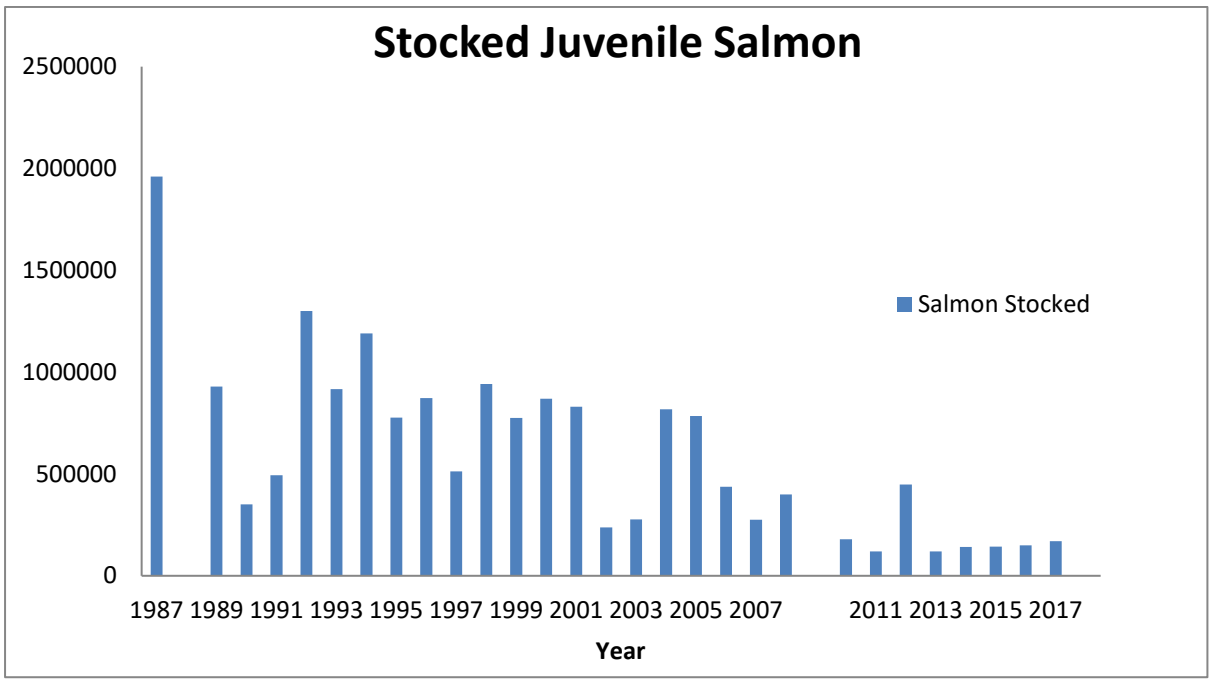
Following discussion with the Game and Wildlife Conservation Trust in Aberdeen, a high-powered agricultural laser was loaned to the trust. GWCT is involved in an EU Life project to investigate the potential for such a laser to scare off mammals, as lasers are already used to scare off certain bird species. I was curious to see if this could be another tool used to scare off piscivorous birds. SNH grants us a license to scare with shooting a small number of birds permitted to reinforce the scaring. Therefore, it is important to show SNH that we are investigating non-lethal alternatives to shooting. The results of this have been somewhat mixed but will be detailed later.

In the final week of the year I undertook a visit to the team at the Game and Wildlife Conservation Trust's base on the River Frome. This was to examine their operation, as they also undertake PIT tagging of Salmon but for different purposes. This was an insightful trip, in which I gained some valuable knowledge about alternative ways of PIT tagging and detection arrays, operation of a bubble screen deterrent and operation of a wolf trap for acoustic tagging of sea trout kelts.

Figure 2. Floating PIT tag array on the River Frome. Upstream of this array is the acoustic bubble screen used to divert smolts into a side channel.

1.4 Hatchery 2017/18

No broodstock were collected in the autumn of 2017 or 2018 and no salmon were stocked during 2018. All hatchery facilities have been placed on a full care and maintenance programme in order that the facilities can be utilised in the future as and when required.



1.5 Consultations

Kyle Fisheries are consulted routinely on proposed developments and other fishery related matters. We aim to respond to all consultations as timeously as possible. In 2018 the consultations received were in the following categories:

- Aquaculture – 4 consultations.
- Forestry – 4 consultations.
- Terrestrial wind farms – 4 consultations.
- Marine wind farms – 1 consultation.
- Other – 2 consultations.

1.6 Predator Control

The Board remains an active participant in the Moray Firth Seal Management Plan and is also part of a coalition of Moray Firth fishery boards that collectively applies for a licence to shoot a limited quantity of piscivorous birds as an aid to scaring. In recent years a licence to shoot a small number of piscivorous birds has been received following the submission of an application to SNH. Counts of birds at a catchment level are undertaken by a combination of Kyle Fisheries staff and river workers in order to provide supporting information. Efforts in terms of scaring birds typically concentrate on the period leading up to and including the smolt run.

Towards the latter end of the year an investigation was conducted into the use of a laser to scare sawbills, with mixed success. More on this can be found under the trust section.

1.7 Complaints

The Kyle of Sutherland District Salmon Fishery Board has a formal complaints procedure which can be viewed at:

https://kylefisheries.org/about-us/board/complaints-procedure

In 2018 a total of three complaints were received. All relate to the demolition of a building associated with the netting industry in the ownership of the Kyle of Sutherland District Salmon Fishery Board. The complainants felt that the building should not have been destroyed and that there was a lack of community consultation prior to the demolition.

In the first instance the complainants were contacted by the Director and Chairman and an explanation given as to the reasons for the demolition of the building. In each case the complaint was not upheld. One of the complainants did not wish the complaint to proceed any further, however two complainants asked for the matter to be discussed at a full meeting of the Kyle of Sutherland District Salmon Fishery Board. The issue was discussed at the meeting held on 29th June 2018. The Board did not find in the complainant's favor. However, the Board established an action point to attempt to increase the information available regarding the historical and cultural importance of the salmon netting industry in the Bonar Bridge area.

1.8 Compliance

Statutory good governance obligations are placed on district salmon fishery boards as defined in law by section 46 of the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003. They

comprise the original obligations placed on boards by the 2003 Act together with those introduced through amendments of the 2003 Act by the Aquaculture and Fisheries (Scotland) Act 2013 which came into force on the 16th September 2013. The purpose of the obligations is to enhance openness, transparency and accountability of the management of salmon fisheries by district salmon fishery boards. They bring together existing best practice to ensure that all boards act in a manner consistent with bodies operating in the public sphere. Key activities covered by these obligations include:

- Annual reports and accounts
- Meetings of the board
- Complaints procedures
- Register of member's interests.

In order to comply with these obligations an annual public meeting and annual meeting of the qualified proprietors was held in 2018. Meeting notices and minutes of all meetings held are forwarded to the Scottish Government as is a copy of the Annual Report. Meetings are advertised on the Kyle Fisheries website as well as at the office building in Ardgay. A complaints procedure is included in the policies section of the website and a register of members interests is maintained at the Kyle Fisheries office.

1.9 Juvenile Surveys

In 2018 Kyle Fisheries participated in the Scottish Governments National Electrofishing Programme for Scotland (NEPS) by fishing 30 sites across the catchment. This will be covered in the Trust section on page x. The electrofishing carried out by the board in response to specific management issues.

Carron

In addition to the NEPS electrofishing on the River Carron, Kyle Fisheries also conducted routine surveys at sites of key interest. Electrofishing took place above the dam at Glean Beag as we have had more reports of Salmon getting upstream of the dam. This is of concern given that there are no smolt passage facilities in the dam that would allow fish to migrate to the sea. Any progeny from salmon spawning in the area would therefore be lost. In order to assess if salmon had indeed accessed spawning areas upstream of the dam, presence/absence surveys were conducted in what was considered good spawning habitat at ten sites. Hybrid or pure salmon were again found above the dam.

Code	Location	Trout	Hybrid?
CN/GB/01/PA	Gleann Beag	✓	
CN/GB/02/PA	Gleann Beag	✓	
CN/GB/03/PA	Gleann Beag	✓	✓
CN/GB/04/PA	Gleann Beag		✓
CN/GB/05/PA	Gleann Beag	✓	✓
CN/GB/06/PA	Gleann Beag		✓
CN/GB/07/PA	Gleann Beag		✓
CN/GB/08/PA	Gleann Beag	✓	✓
CN/GB/09/PA	Gleann Beag	✓	✓
CN/GB/10/PA	Gleann Beag	✓	✓

Table 1. Presence/Absence surveys above Glen Beag dam conducted in 2018.

A key site at Deanich was again fished in 2018 with more fry and parr than in previous years. One of the NEPS sites falling near to this site, although in an area of poorer habitat and this was reflected in the numbers. Both Fry and parr at this site (C/GM/01) were up from the previous year. One of the NEPS sites fell ~200m downstream and found no fish, although this was an extremely poor habitat site. Electrofishing was conducted again above and below the dam at Diebidale, with the upstream site (CN/D01)

Code	Location	2018		2017		2016		2015	
		Fry	Parr	Fry	Parr	Fry	Parr	Fry	Parr
CN/D01	Diebidale	0	0	0	0	0	0	17.98	0
CN/D02	Diebidale	81	73	28.59	35.14	-	-	-	-
C/GM/01	Glen Mohr	101	14	82.43	4.32	0	27.64	65.79	11.55

Table 2. Electrofishing sites Above Diebidale dam (CN/D01), below Diebidale dam (CN/D02) and on Glen Mohr.

Oykel

Monitoring out with the NEPS programme on the River Oykel was fairly simple in 2018, as there was fair coverage within the catchment. Monitoring at the pipe bride at Benmore continued, and salmon were found above the culvert, at similar numbers to 2017, although lower than 2016 and with les fry than 2015. Monitoring of this will continue to investigate any trends in the salmon numbers above the pipe bridge.

Code	Location	2018		2017		2016		2015	
		Fry	Parr	Fry	Parr	Fry	Parr	Fry	Parr
ACA/01	Allt na Cailliche	94.15	17.05	141.62	80.72	-	-	246.65	27.5*
ACA/02	Allt na Cailliche	19.86	10.82	18.62	24.09	62.50*	26.67	124.48	8.30*

Table 3. Quantitative surveys on Allt na Cailliche. ACA/01 being below the pipe bridge, and ACA/02 above it. Zippin values used except where denotes minimum density estimate.*

Cassley

The NEPS sites on the River Cassley gave good coverage, above and below Duchally dam, and up in Glen Muick. As such, the board had no management concerns which required electrofishing on the Cassley. However, whilst electrofishing the Glen Muick burn a potential obstacle was identified. The NEPS site was above this obstacle and no salmon were found. Below this obstacle we conducted some timed electrofishing surveys to investigate if salmon get that far up, and salmon were found to be present. Future monitoring may include sites above this potential obstacle to discern whether it is an impassable barrier to fish movement.

Code	Location	2018	
		Fry	Parr
CS/M/03/T	Muick	1.2	2
CS/M/04/T	Muick	7.2	0.2

Table 4. Timed electrofishing surveys on the Glen Muick burn. numbers are fish per minute, with surveys being 5 minutes long.

Shin

Electrofishing was conducted in the reaches of the upper Shin and on the mainstem. Sites on the River Fiag and River Tirry were completed in order to asses how effective the trap and truck operations have been. Sites on the Fiag had parr densities well above what was present in 2017, although fry densities were reduced in two of the three sites. It is possible that the extremely warm temperatures in this summer had an impact on fry survival.

Code	Location	2018		2017	
		Fry	Parr	Fry	Parr
RFS/06	Fiag	0	16.5	4.49*	3.75
RFS/05	Fiag	8	40	38.42	21.43
RFS/03	Fiag	40	59	21.99	50.44

Table 5. Quantitative electrofishing surveys on the River Fiag. Zippin values used except where denotes minimum density estimate.*

Only 4 sites on the River Tirry were electrofished, due to the added burden of the extra 30 NEPS sites in 2018. Fry were only found to be preset in Feith Osdail. This would suggest that no adult salmon had made it up to the upper reaches of Crask to spawn in 2017. The fry numbers at Crask in 2017 are likely to be heavily composed of stocked fry which were released in late April/early May of 2017. However, more electrofishing sites will be added in order to get a more thorough understanding of spawning activity on the Tirry.

Code	Location	2018		2017		2016		2015	
		Fry	Parr	Fry	Parr	Fry	Parr	Fry	Parr
ST/06	Tirry	0	25.28*	175.92	12.78	61.73	21.42	163.59	0
STC/09	Tirry	-	-	61.73	4.97	-	-	124.45	2.24
STR/01	Rhian	-	-	14.48	0	-	-	-	-
STFO/01	Osdail	5.65	8.37	40.42	6.11	-	-	-	-
ST/09	Tirry	0	17.56	-	-	-	-	-	-
ST/10	Tirry	0	2.2*	-	-	-	-	-	-

Table 6. Electrofishing Surveys conducted on the River Tirry. Zippin values used except where denotes minimum density estimate.*

Four routine monitoring sites on the mainstem of the Shin were conducted, and one on the Lairg burn which did not contain any salmon, but trout and a possible hybrid were found. Fry numbers on RS/01 at Lilleys were the highest they've been since 2015, although parr numbers were relatively low. Similarly,

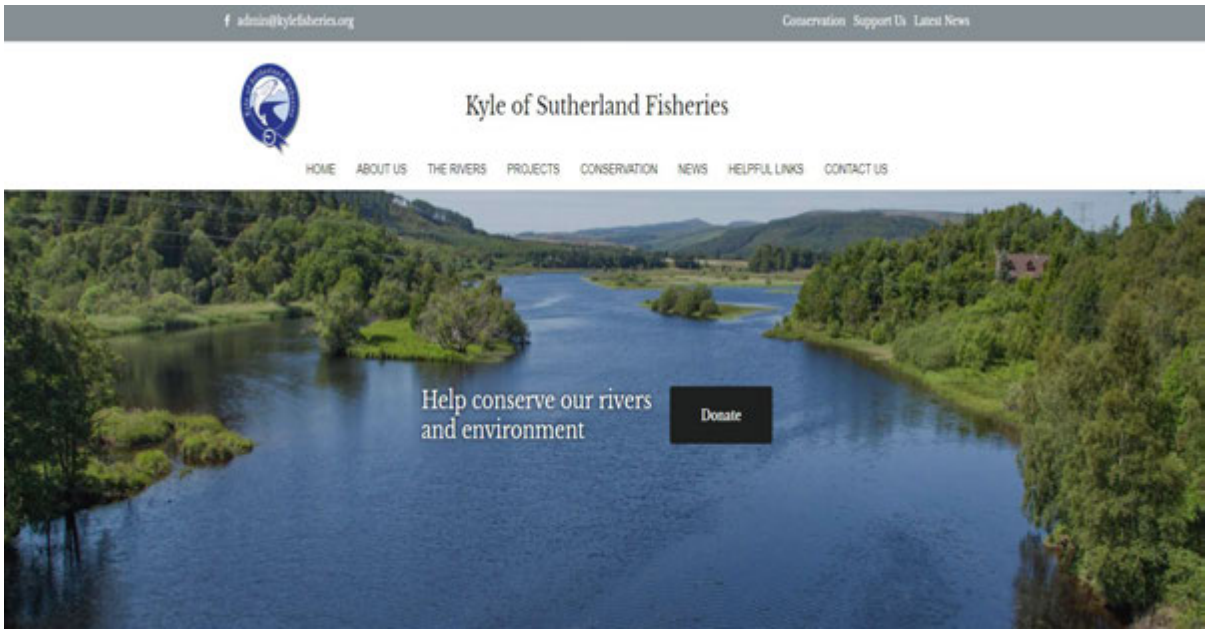
Code	Location	2018		2017		2016		2015	
		Fry	Parr	Fry	Parr	Fry	Parr	Fry	Parr
RS/04	River Shin	53.75	16.55	-	-	-	-	-	-
RS/01	River Shin	256.49	3.76*	113.62	1.50*	187.33	4.92	204.52	1.00*
RS/03	River Shin	60.61	28.787	-	-	-	-	-	-
RS/06	River Shin	101.98	37.06	62.9	31.3	62.9	31.3	-	-
S/LB/01	Lairg Burn	0	0	-	-	-	-	-	-

Table 7. Electrofishing Surveys conducted on the main stem of the River Shin. Zippin values used except where denotes minimum density estimate.*

Evelix

There were no pressing concerns on the River Evelix which warranted electrofishing. However, nine NEPS surveys fell on the Evelix, and we felt this gave very good coverage across the catchment.

1.10 Website redevelopment



2018 saw the launch of the new combined Board and Trust website, achieved after months of hard work by Jacqui Hamblin the Kyle Fisheries Administrator. What we have now is a fast flowing (no pun intended) visually appealing and interactive site. It includes updated information regarding the individual RIVER BEATS, with click through links to the appropriate contacts for interested anglers and bookings etc. In the NEWS feature, we publish regular articles about what is happening in the Kyle catchment now and this links in very well with our FACEBOOK page handled by our Science Officer Sean Robertson. Indeed, Sean provided many of the beautiful photographs used on the website.

One of the benefits of the new site over the former is we are in control and are therefore able to instantly change the content ourselves. This means we can immediately react and promote current news items and projects such as the AST 'MISSING SALMON PROJECT'.

We have also introduced a 'DONATE NOW' feature that enables interested parties and possible new members to donate to the Trust immediately through the site. If wished they can donate to a specific project and Gift Aid all at the same time.

We are constantly looking to improve on what we publish and have recently added a section on the science results for those who are interested in the data and statistics from the investigative studies and projects we are involved in. We intend to keep the site relevant, interesting and timely. We therefore welcome feedback and would also be happy to receive related features for inclusion or promotion on the site.

www.kylefisheries.org www.facebook.com/KyleFisheries/

Kyle of Sutherland Fisheries Trust

2.1 National Electrofishing Programme for Scotland

In 2018 the Trust conducted 30 electrofishing surveys for the Scottish Government's National Electrofishing Programme for Scotland (NEPS). The rationale of this project was to find a way to incorporate juvenile electrofishing data into the rod catch assessment. This would be extremely beneficial for rivers such as the Evelix, where rod effort is extremely low and a category 3 designation is likely even though it may not be an accurate reflection of health of the salmon population.

The study design chooses sites at random, using a "generalized random tessellation stratified" (GRTS) approach. This excludes watercourses which are at the extremes and unlikely to have salmon present or those which will not be fishable. Watercourses which were marked as inaccessible to salmon on SEPA's database were also excluded. Sites are then randomly selected from the remaining watercourses.

Although it may seem unproductive to electrofish areas where fish are not known to be present, we felt it was still important to try. During periods where there is an abundance of salmon, juveniles may be found in areas where they would not normally be found. Conversely in years when salmon abundance is low, the areas of best habitat will likely be that last areas to see a decrease, and a decline may only be noticed long after a problem has occurred. By choosing random sites the biased approach of only fishing in areas of good habitat is removed, and it is possible to model a more accurate representation of the health of the river.

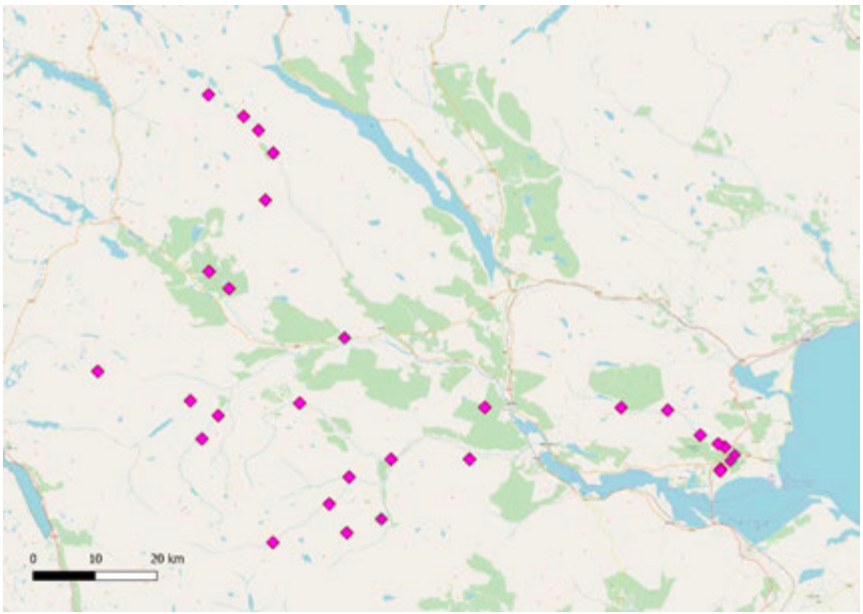


Figure 3. Map of electrofishing sites for the NEPS project. Millidine, K. J., Fryer, R. J., Jackson, F. L., Glover, R. S., & Malcolm, I. A. 2018. Site locations for the National Electrofishing Programme for Scotland (NEPS) and west coast SAC rivers (2018). DOI: 10.7489/12112-1

Nine surveys were on the River Evelix, 5 on the Cassley, 8 in the Carron Catchment, and 7 in the Oykel catchment, as well as 1 on the Culrain burn were fished. The Shin system was not included above Lairg dam, as this is classed as a barrier to downstream smolt passage on SEPA's database. Although fish are able to ascend the dam to spawn, we felt that the area should still be excluded as we regard Loch Shin to be artificially stocked by fish farm escapees. However, the board conducted electrofishing surveys in the Shin system in response to specific management questions.

The sites gave a wide coverage of the catchment and led us to areas we would not normally fish. The habitat quality was extremely variable across sites, with most sites landing in areas of less favorable habitat. As a consequence, numbers of juvenile salmon were generally quite low, although some sites

stood out with high densities. The Pobilidh burn in the Oykel catchment and the River Evelix had quite high numbers. If would be inappropriate to report them here, as the question these sites are being used to ask requires Marine Scotland to incorporate the numbers into some intricate mathematical models. If we were to look at the raw numbers, it may give a false impression of the health of the rivers. The report from Marine Scotland is expected to be released around the end of March.

If successful, it is expected that the NEPS project will continue in future years. The 30 sites is made up of 3 panels, 10 sites fished annually, 10 sites fished once every 3 years, and 10 sites fished once every 9 years. So although some sites will be the same in future years there will still be vatiation.

In addition, while electrofishing on the Tutim burn a juvenile lamprey was caught. While lamprey are known to be present in the district, this is the first instance of a lamprey being recorded in the Kyle of Sutherland District in the SFCC database.

Figure 4. A juvenile Lamprey caught in the Tutim burn.

2.2 Aquaculture Interactions Genetics

Attached to the NEPS project was a salmon aquaculture interactions project being run by Marine Scotland Science. This aims to assess if farmed escapees have successfully been breeding with wild Salmon by following a similar approach to that which has been used in Norway.

Across Scotland, fishery trusts took genetic samples from salmon parr from each of the 3-run sites. The purpose of this was to build a baseline for the genetics of wild salmon in Scotland. In addition to this, 8 sites from within the District within proximity to aquaculture sites were also sampled. These sites were randomly selected which gives more power to the statistics when analyzing the data, it allows greater confidence when upscaling the estimated number of introgressed fish.

Figure 5. Map showing the locations of electrofishing sites for Marine Scotland's interactions genetics project.

This interactions project will span 3 years. The first year is looking at introgression near freshwater smolt rearing sites, followed by including marine sites in the second year and examining historical introgression in the final year. A report on this should be due around the same time as the NEPS report is produced.

In addition, UHI are examining potential introgression in smolt samples taken from the Fiag and Tirry trapping operations in 2017. Their report is due in the first half of 2019. As well as the difference of UHI's analysis examining smolts instead of parr, they are also taking a different approach but utilizing a subset of Norwegian markers as opposed to creating a bespoke set of markers. This is due to MSS having the ability to take samples directly from fish farms, but UHI are unable to do this hence using a Norwegian marker set. However, UHI have a good baseline of wild Scottish salmon from the FASMOP project.

2.3 Shin smolt trapping

Smolt trapping operations took place on the Shin system again, with traps operating on the River Fiag, River Tirry, Corriekinloch and Loch a' Ghrima. Kyle Fisheries undertakes this trapping on the Fiag and Tirry with funding and assistance from SSE. Migdale Smolt provide funding and payment in kind of staff time to assist with the traps at Loch a' Ghrima and Corriekinloch.

Figure 6. Map showing locations of smolt trap sites, dams and the release location in the Shin system.

Over the course of the run 8 smolts were tagged from Corriekinloch, 150 from Merkland, 1334 from Fiag and 450 from the River Tirry. More were due to be tagged on the River Tirry, however the run finished abruptly and much earlier than expected. As a consequence, only 3 mark-recapture trials were able to be undertaken but as per previous years the capture efficiency was low.

	Corriekinloch		Merkland		Fiag		Tirry	
Year	Putative Farmed	Wild Smolts	Putative Farmed	Wild Smolts	Putative Farmed	Wild Smolts	Putative Farmed	Wild Smolts
2011	19	24	288	217	9	1924	0	1350
2012	1	42	537	507	2	2149	0	1021
2013	0	12	373	553	4	2523	0	604
2014	0	22	301	262	0	726	0	2351
2015	0	32	144	590	2	2261	0	803
2016	0	21	217	441	11	7240	0	238
2017	-	-	-	-	0	2599	0	2049
2018	0	10	148	156	1	4374	1	1449

Figure 7. Table showing total numbers of wild and putative farmed smolts caught in traps since 2011.

The mark recapture trials allow for the size of the smolt run to be estimated, as per the American fisheries handbook. The River Fiag run was estimated at 5832 smolts and the Tirry at 6973. Although the estimate for the Tirry is higher than that of the Fiag, so is the uncertainty which is denoted by the error bars. The wide uncertainty is generated by a low trap efficiency.

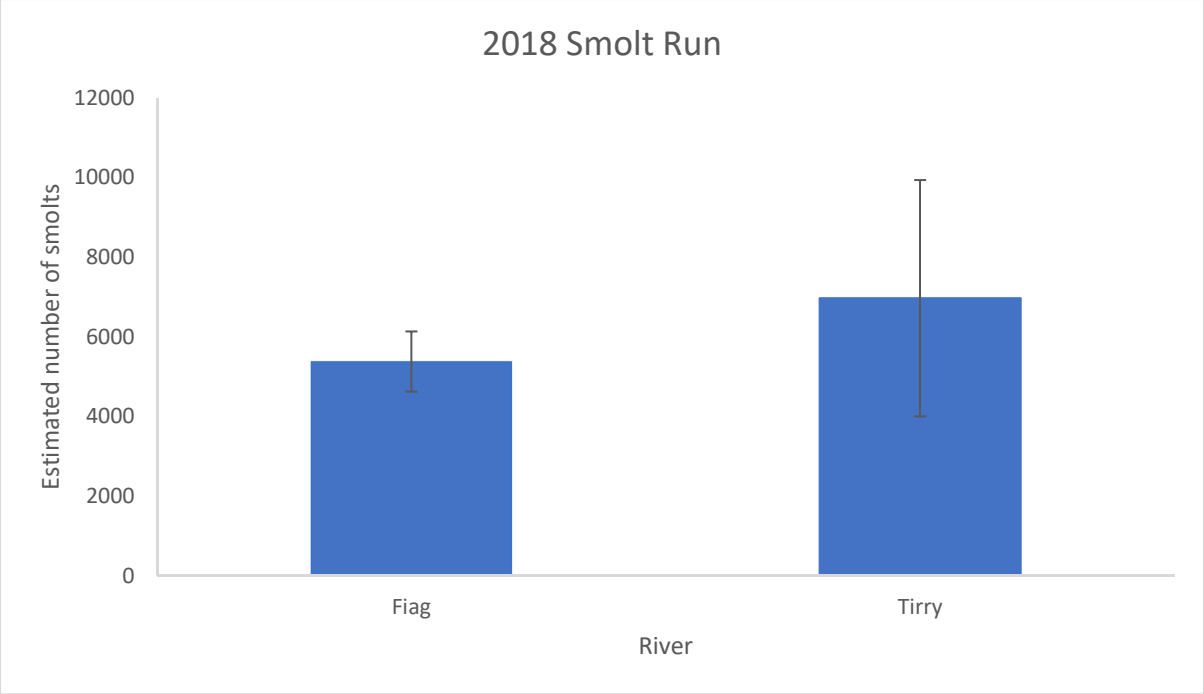


Figure 8. Estimates of smolt run magnitude on the Fiag and Tirry rivers, and associated error.

Tagged fish returning in 2018

Year	River	Number returning as adults in 2018
2015	Fiag	0
	Tirry	1
2016	Fiag	16
	Tirry	0
2017	Fiag	11
	Tirry	12

Table 8. Returning PIT tagged fish ascending the Shin diversion dam fish pass in 2018. 5 of the returning Fiag fish in 2016 were from the flow trials.

2.4 Carron Temperature Network

In 2017 temperature loggers were deployed in strategic locations on the River Oykel. This was inspired by the Scottish Government's Scottish River Temperature Monitoring Network (SRTMN) project which deployed loggers on the River Oykel as well as on other Rivers across Scotland. This temperature network would allow Kyle Fisheries to monitor for patterns in temperature changes across time and to identify patterns. Additionally, the network would allow for the effect of riparian tree planting to be assessed.

The network encountered a problem which has been noted before by Marine Scotland with their use of the Gemini tinytag loggers. The loggers have a limited memory which requires them to be checked every 11 months or so. An issue has been noted before that loggers will sometimes not wipe the data after being downloaded, resulting in the memory becoming full and recording to stop. Its an easy problem to miss if operators are not aware of it.

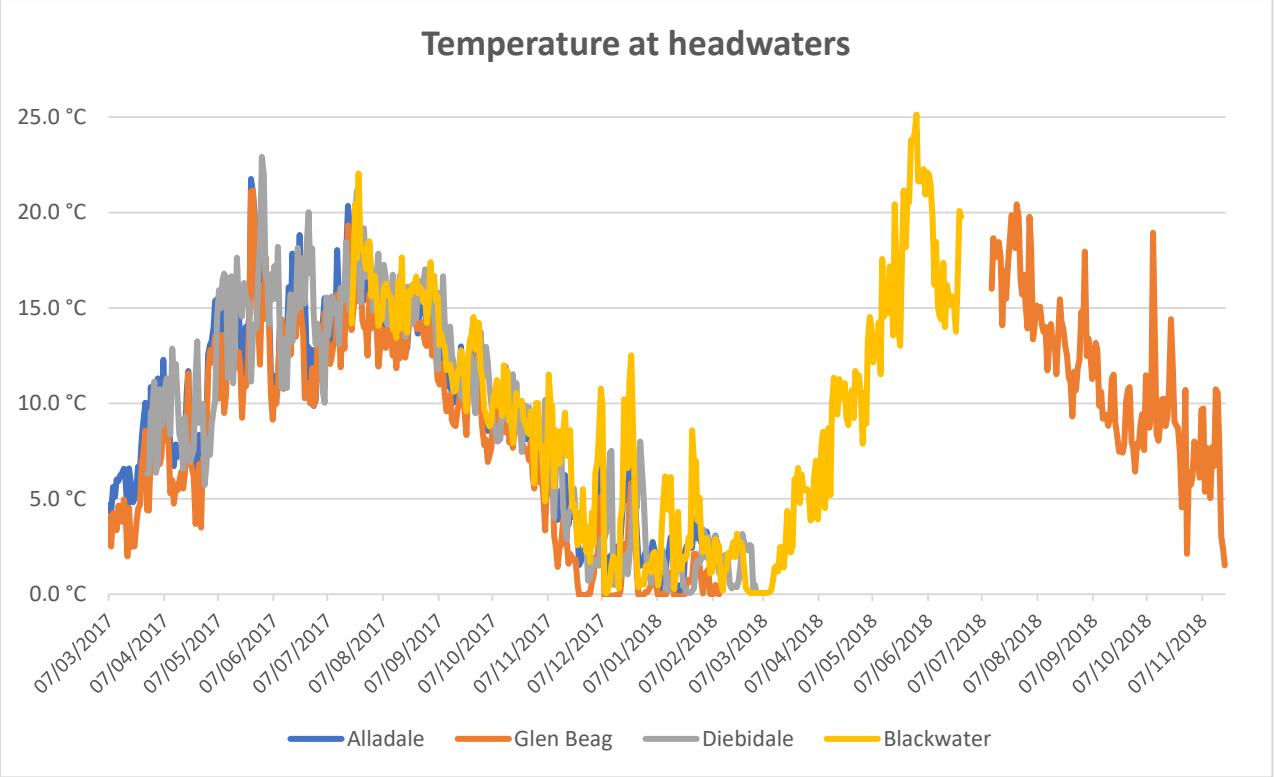


Figure 9. Daily maximum temperature at the uppermost loggers.

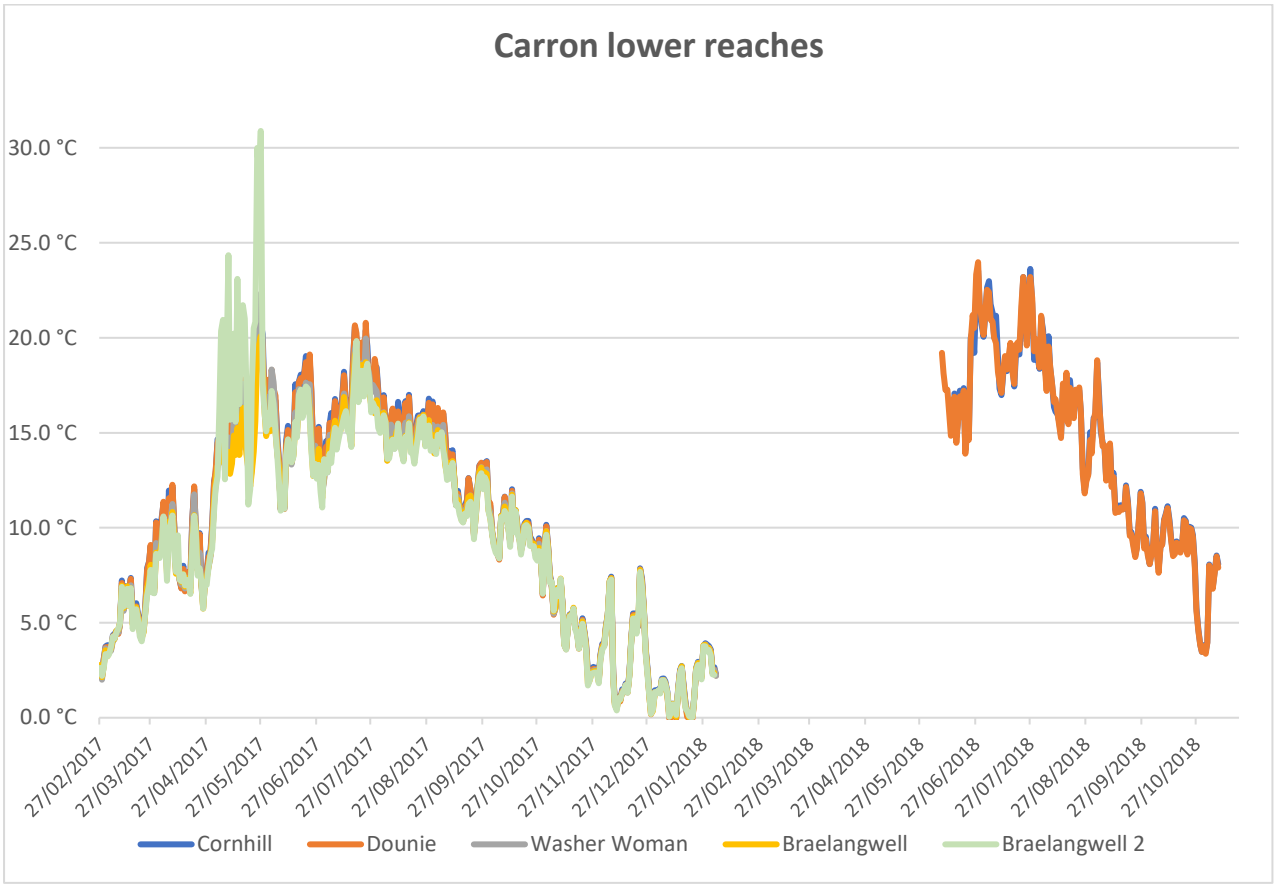


Figure 10. Daily maximum temperature at loggers lower on the main stem of the Carron.

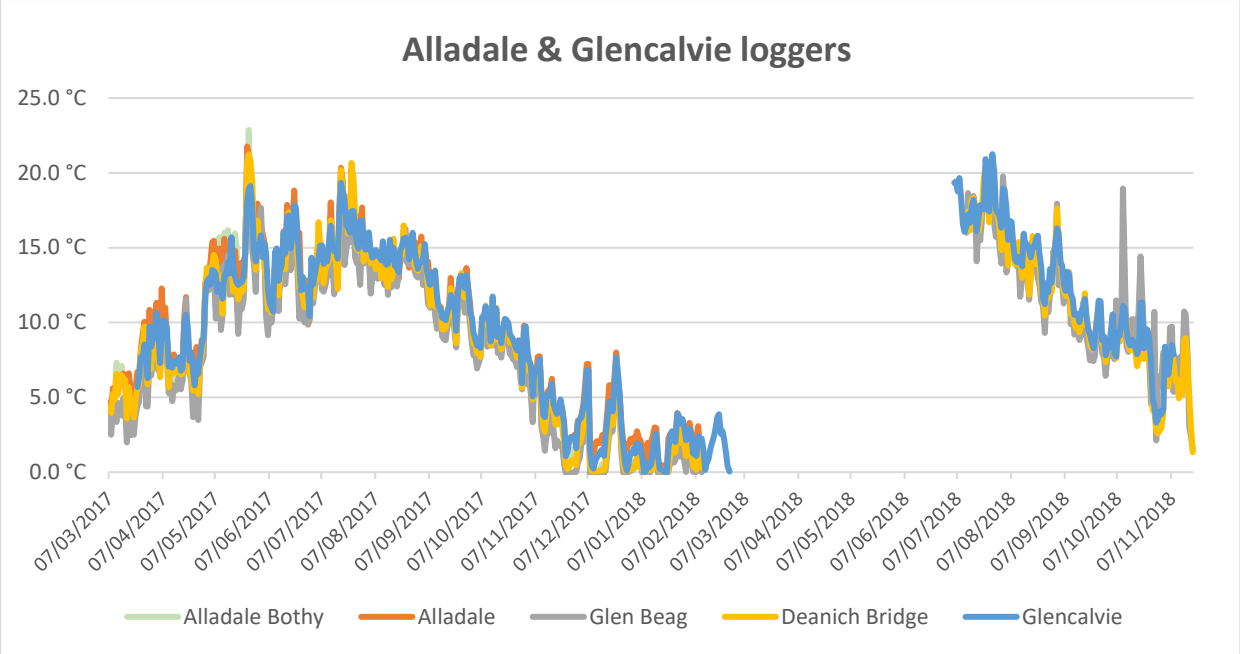


Figure 11. Daily maximum temperature at the loggers in Alladale estate and below Glencalvie falls.

Temperature in the headwaters showed similar patters throughout the year, with variation in where the hottest temperature was. Diebidale tended to have the hottest daily maximum temperature until around November 2017, upon when the blackwater logger recorded the highest temperature. An extreme anomaly noted is the Braelangwell 2 logger at the Morral pool. This logger reached a temperature of over 30 degrees in the summer of 2017 where no other loggers came close to such a temperature. It is highly likely that this logger was washed out in a spate, hence the abnormally high temperature.

In spate conditions loggers can become washed out, when the Glen Beag and Blackwater loggers were checked in November 2018 they were on the banks as there had been a recent spate. Loggers require to be checked after such events, as data from when a logger is on dry land can cause us to come to false conclusions about the river temperature.

The graphs which are shown here summarize the maximum temperature recorded at each logger per day. However as the loggers record every 15 mins (now set to every 30 mins to extend battery life and data storage) this also allows for the daily minimum temperature recorded. The difference between the daily max and min can be quite large. There are other more complex analyses that can be done, however this will require the data to be consistently recorded at each logger. Now that the network has been cleared and loggers are now functioning properly, these more complex analysis will become possible in future. The trust will fit new batteries to each logger in 2019 so they continue to collect data.

2.5 Oykel Temperature Network

The Trust continued to collect data from the Oykel's temperature network in 2018. With the warm summer, the outputs will hopefully provide some useful information. In 2019 it is expected that MSS will make data available via a "shiney" app on their website. The trust received a grant for past work done retrieving data from the network and maintaining loggers.

2.6 Fish Rescue

We were asked to undertake a fish rescue by Scottish Water in the Evelix catchment on An Ubidh Dubih, which was predicted to run dry during the warm summer. This was electrofished and in the region of 40 juvenile trout were removed. Trout were not previously believed to be present in this burn, so this fish rescue has slightly widened the brown trout distribution.

2.7 Use of a high-powered laser to aid in sawbill scaring

Fish eating birds are one of the poorly understood issues facing salmon conservation. While an increase in the number of birds would be expected to have an impact on salmon this potential impact has not been quantified. Currently SNH grant a license for the scaring of piscivorous birds (cormorants, goosanders and mergansers), with a small number granted to reinforce the scaring with legal methods. Currently, SNH favor non-lethal methods of scaring such as gas guns.

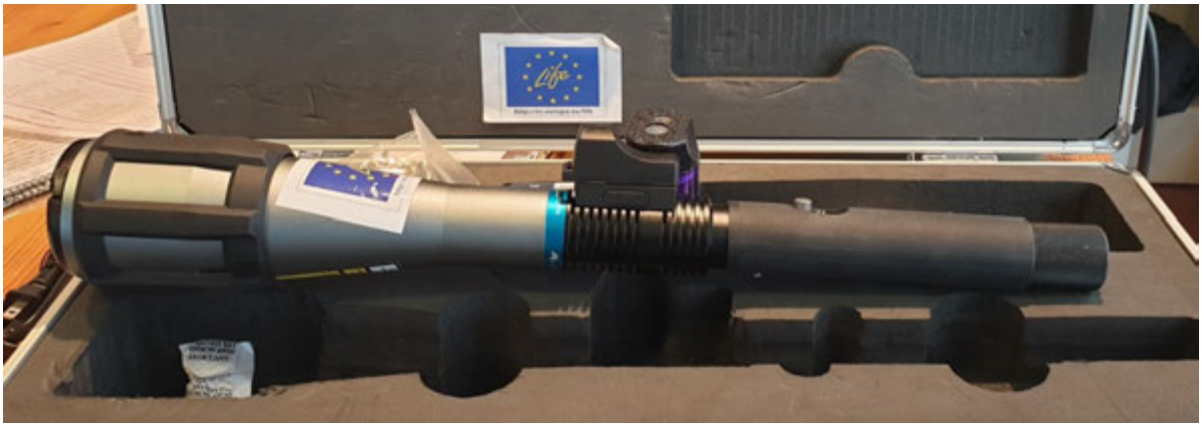


Figure 12. The handheld AgriLaser used in the sawbill scaring investigation.

Lasers are used in other instances to scare off birds, such as scaring geese off runways at airports. When in use a bird is not dazzled by a laser, instead the moving dot is perceived as a threat and birds disperse. Therefore, it was identified as a potential method to add to the repertoire to scare piscivorous birds, especially during times when fish are particularly vulnerable such as the smolt run. The manufacturer has also noted that with persistent use birds will avoid the area in which a laser has been used. If successful, this could be a valuable tool to add to our bird scaring toolbox.

Dr David Parish from Game and Wildlife Conservation Trust's farm in Auchenerran kindly loaned the Trust a handheld AgriLaser. GWCT have been experimenting with their use as part of the EU LIFE Laserfence project, which has been examining scaring in mammals.

Over the course of November – January trials were undertaken when time allowed. Birds were searched for on the Carron, Shin, Oykel and on the Kyle. It was attempted to identify "hotspots" of where birds would gather, although very few were identified which resulted in a small sample size. Generally, cormorants did not disperse when the laser was used and goosanders tended to only disperse in low light conditions. Other boards have investigated this as well and have found that cormorants disperse at dusk (Tweed, with shooting to reinforce the laser use) or only disperse a short distance (Dee). Although we did not use other methods to reinforce the scaring, as this trial was to asses how effective the laser was at scaring on its own. As the laser was largely ineffective or only partially effective under certain lighting conditions, we deem it to not be appropriate for scaring piscivorous birds in the district. However, the laser was extremely effective at scaring non-target species, mallards, widgeon and herons. As these were non target species data was not properly recorded.

2.8 Frome visit

In December of 2018 our Science and Mitigation Officer visited the GWCT's fisheries office on the River Frome in Dorset. GWCT operate a PIT tagging programme similar to Kyle Fisheries, albeit on a larger scale with 10,000 parr being tagged annually. Multiple in-river detection arrays are in place which allow for the detection of parr migrating, and indeed this has shown an autumn migration of parr. By visiting their tagging operations, it was hoped that a knowledge exchange may be facilitated, and indeed the trip provided valuable information.

In addition, Sean observed their sea trout tagging which runs on a modified eel trap (and functions as a wolf trap). Tagging takes place during the night they capture sea trout kelts migrating downstream. Kelts are fitted with PIT, acoustic and data storage (which record depths) tags in order to learn more about their migration. Genetic samples and scale samples are also taken, and the fish are tattooed and floy tagged so that they may be identified if caught.

As well as the similarities in PIT tagging, GWCT also use a dual bubble/acoustic screen to divert smolts into a side channel for monitoring the numbers leaving the system. SSE are trialing the same technique on the Meig in the Conon district, which may also prove useful as an alternative to the current trapping setup on the River Tirry. High deflection rates (around 70%) are achieved with both bubbles and acoustics, whereas only around 40% deflection is noted with either used in isolation. The Frome is a much different river to Rivers in Scotland, as a Chalk stream it lacks the high energy that rivers have in Scotland. As a result, juvenile salmon rely on aquatic vegetation much more for cover, whereas our rivers have larger sized mixed substrate which provides the same function. The Frome is a relatively calm river in comparison to the Meig or the River Tirry which may further aid the deflection efficiency. In a Scottish spate river however, the deflection rate may be much lower. We will be keeping an eye on the trial on the Meig with interest.

Kyle of Sutherland District Salmon Fishery Board
Profit and Loss Account - Year Ending 31st May 2018

		2018		2017
Revenue		**£**		**£**
Turnover		293,714		330,676
		293,714		330,676
Cost of sales				
Gross Profit		**293,714**		330,676
Overheads				
Expenses	271,051		329,485	
	271,051		329,485	
Operating Profit /(Loss)		22,663		1,191
Bank interest receivable		16		12
(Loss) / Profit for year		**22,679**		1203

Kyle of Sutherland District Salmon Fishery Board
Balance Sheet - Year Ending 31st May 2018

		2018	2017
		£	**£**
Fixed Assets		**45,263**	22,090
Current Assets			
Debtors	**6,926**		6,576
Bank	**98,413**		100,569
	105,339		107,145
Creditors	**5,270**		6,582
Net current assets/liabilities		**100,069**	100,563
Total assets less current liabilities		**145,332**	122,653
Capital & Reserves		**145,332**	122,653

Full Accounts for both Board and Trust are available from www.kylefisheries.org.

Hard copies available on request.

Kyle of Sutherland Fisheries Trust

Statement of Financial Activities - Year Ended 31 May 2018

Income	Unrestricted	Restricted	Total Funds Year to 31 May 2018	Total Funds Period from 1/4/16 to 31/5/17
Voluntary income	17,375	8,679	**26,054**	55,178
Fundraising				
Other	6,859		**6,859**	5,247
	24,234	8,679	**60,425**	60,425
Expenditure				
Costs of generating funds		(10,398)	**(10,398)**	(24,072)
Costs of other trading activities				(9,500)
Governance	(10,319)	(489)	**(10,807)**	(3,927)
Other expenditure	(12,960)	(62)	**(13,022)**	(18,406)
	(23,279)	(10,949)	**(34,227)**	(55,905)
Net Incoming resources for the year	955	(2,270)	**(1,314)**	(4,520)
Reconciliation of funds				
Total funds brought forward	131,201	28,091	**159,292**	154,772
Total funds carried forward	132,156	25,821	**157,977**	159,292

Kyle of Sutherland Fisheries Trust

Balance Sheet - 31 May 2018

		2018	2017
		£	£
Fixed Assets		**70,889**	71,840
Current Assets			
Debtors	**3,456**		3,369
Bank	**84,778**		92,400
	88,234		95,769
Creditors	**(1,146)**		(8,317)
Net current assets		**87,088**	87,452
Total assets less current liabilities		**157,977**	159,292
Funds			
Restricted Income Funds		**25,821**	28,091
Unrestricted Income Funds		**132,156**	131,201
		157,977	159,292