

TAY DISTRICT SALMON FISHERIES BOARD

Proposals by Scottish Ministers to make conservation regulations under section 38 of the Salmon and Freshwater Fisheries (Consolidation)(Scotland) Act 2003 to regulate the killing of salmon in Scotland including a prohibition on retaining any salmon caught in any coastal waters.

The Tay District Salmon Fisheries Board welcomes the opportunity to make representation on these proposed regulations. We are content that Scottish Ministers make regulations to

- a. to prohibit the retention of salmon caught in coastal waters which will be reviewed in 2018;
- b. to permit the killing of salmon within inland waters where stocks are above a defined conservation limit;
- c. to introduce mandatory catch and release in areas which fall below their defined conservation limit following the annual assessment of salmon stocks; and
- d. to agree a conservation plan in conjunction with Marine Scotland for all areas that have been assessed.
- e. That the carcass tagging regime will continue for commercially caught fish within inland waters in category 1 and 2 areas.

That all said, we only provide our agreement as long as we have confidence in the methods used to define conservation limits and compliance with them.

In response to the consultation on the same regulations in October 2015, we expressed major concerns over many aspects of these methodologies. We now welcome the fact that Scottish Ministers have reviewed some of the methodologies and there have been improvements. We particularly welcome the fact this has meant that, for 2017, the rivers Earn and Eden in this district now have been classified as category 2 instead of category 3. That change has been largely come as a welcome relief on the rivers concerned.

However, while we consider that improvements have been made and the overall process is moving in the right direction, we still have concerns over areas that have yet to be improved and we also have some new concerns over some of the new methodologies. The overall process is not as accurate as it perhaps could be and in our view still operates unfairly against rivers with predominantly autumn salmon runs. These issues will emerge below.

Some of our major concerns are now outlined.

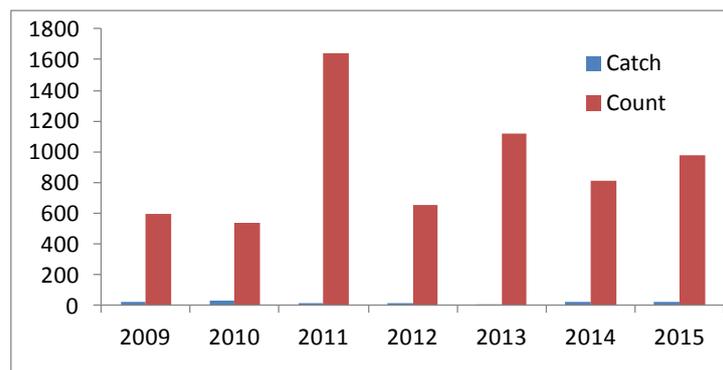
Paper entitled *Estimating number of salmon*

We refer to the above paper which has been posted on the Marine Scotland website.

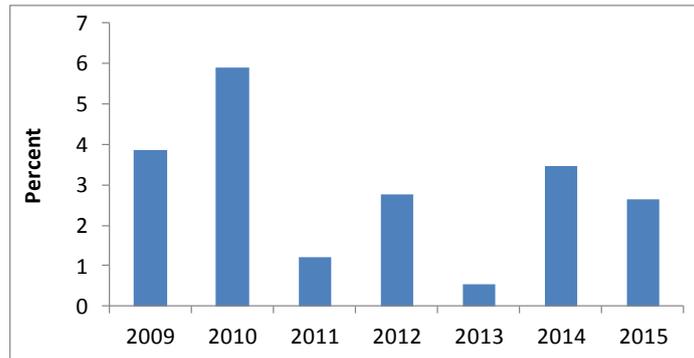
1. We welcome the inclusion of a correction factor for the impact of low flows on catches. This was one of the major concerns we raised last year. However, we do note that on page 2 of the report, a reference is made to “anecdotal evidence that at extremely low flows fish can be more vulnerable to angling”. This is not a concept with which we are familiar and would like to see the justification for this claim. We do not believe this to be a general case, quite the opposite. If the data available to MSS do suggest increasing catches relative to counts at low flows, then we suggest the data should be subject to detailed scrutiny to ensure this is not some form of spurious artefact. As we show below, the data used in this paper, do produce a number of these.
2. We note that data from the Pitlochry Dam fish counter is now being used in the analysis. We have a high degree of familiarity with this counter and would offer some comment as follows.
 - 2.1 Salmon do not necessarily ascend Pitlochry Dam soon after entry to the River Tay from the sea. In the spring, for example, it is too cold for salmon to ascend in any number until at least May and sometimes later. The first major runs take place in either May or June depending on weather. However, the radio tracking study by A. Gowans in the 1990s found that adult fish tagged below the dam in April might sometimes not ascend the dam until as late as July. Thus counts, particularly during the months of May and June and even to some extent July, may not reflect the strength of runs of fish entering from the sea in those months but may be higher than they ought to be as they include a back log of “earlier” spring fish.
 - 2.2 It is the case that, especially in late summer, fish may not even enter the lower River Tummel from the Tay nor ascend the fish pass if flows are very low. We stress very low. However, if flows are higher than “very low”, then fish often enter the fish pass in greater numbers during lower flows than during persistent high flows. This is because the entrance to the fish pass is less attractive to fish compared to the power station tailrace under high flows. Thus, compared to some rivers, good runs of fish may take place at Pitlochry further down the flow duration curve than is usual and poorer runs in very wet weather.
 - 2.3 The River Tummel below Pitlochry Dam is a large river with a somewhat unnatural flow regime. It has been significantly altered by hydro regulation. However, the main salmon producing tributaries upstream of Pitlochry are disproportionately small in

comparison to the mean flow of the lower Tummel. The overall run of salmon in the Tummel and catch is relatively small compared to the river's mean flow – artefacts of flow regulation and catchments consisting mainly of large lochs. The main angling area upstream of Pitlochry Dam is also in a relatively small spate river, the River Garry. The flow regime in the lower Garry (not to be confused with the dry upper reaches) is very different to that in the lower Tummel. Conditions under which fish might be encouraged to ascend Pitlochry Dam might be too dry for good fishing in the Garry.

2.4 The issues described above regarding Pitlochry Dam and fishing in the River Garry create difficulties in using the data so obtained for extrapolating to other salmon rivers. For example, Figure 2 on page 3 of the report shows that, for the month of July, Pitlochry requires a much higher count to generate an equivalent catch than on other rivers. This, we suggest is something of an artefact. As explained above, the salmon count at Pitlochry Dam in July is usually one of the higher months of the year. Water levels are almost always suitable to attract fish to run as are temperatures and, as well as fresh run salmon and grilse (though less of the latter in July in recent times), fish that entered freshwater in previous months may also ascend. However, catches upstream tend to be very low in July, perhaps partly because the Garry is often too low then. Perhaps fishing effort is less than too as expectation may be lower at that time. Based on our own data, the figure below shows the July counts (net upstream) of salmon at Pitlochry Dam from 2009 to 2015 plus the catch reported to us from beats upstream. The second figure expresses the catch as a percentage of the count (note 2013 catch reports are incomplete).

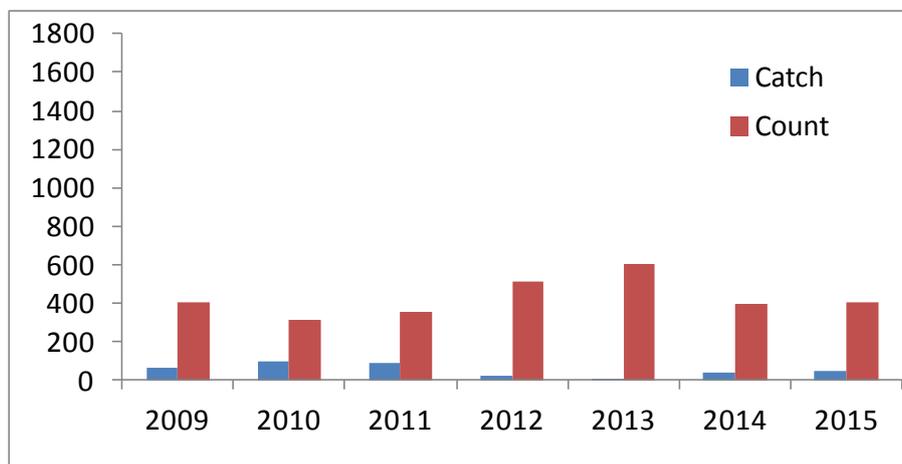


Salmon counts at Pitlochry Dam (net upstream counts supplied by SSE) and salmon catches from beats upstream of Pitlochry Dam as reported to TDSFB, for the month of July, 2009 – 2015. Note incomplete returns were received in 2013.

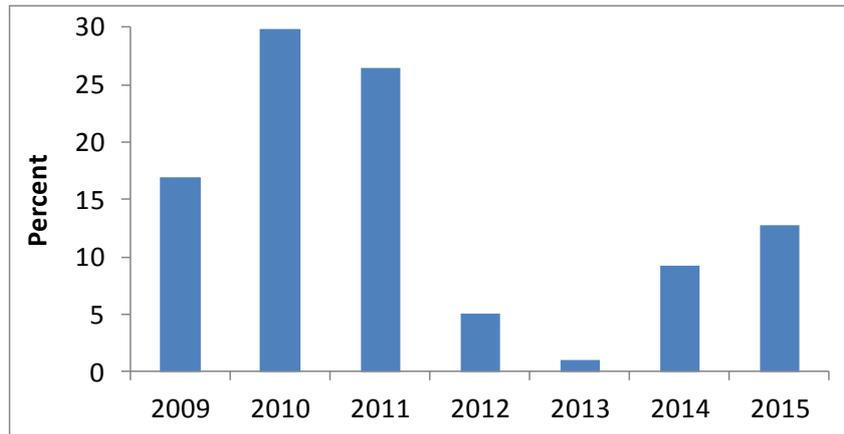


Salmon catches reported from beats above Pitlochry Dam in July expressed as percentage of the July count, 2009 – 2015. Note previous comment regarding 2013.

2.5 In fact the highest catches upstream of Pitlochry Dam often take place in the autumn. Our data indicate that September is usually the month with the highest reported catch. However, because the Tummel is a spring salmon / summer grilse river, counts in September tend to be relatively low, except if there is a severe summer drought. Most of the fish caught in the Garry in September are old coloured fish, but still. Almost all are released nowadays. There is often a build up of fish in the areas where most angling takes place, a build up of fish that have collected over a number of months, from May in fact. Thus, the catch in September appears high relative to the number of fish which run Pitlochry Dam in that month. Indeed, it might not be surprising even that some of the fish caught are caught more than once.



Salmon counts at Pitlochry Dam (net upstream counts supplied by SSE) and salmon catches from beats upstream of Pitlochry Dam as reported to TDSFB, for the month of September, 2009 – 2015. Note incomplete returns were received in 2013.



Salmon catches reported from beats above Pitlochry Dam in September expressed as percentage of the September count, 2009 – 2015. Note previous comment regarding 2013.

- 2.6 Therefore, by including Pitlochry Dam in this exercise, we suggest that summer exploitation rates will appear lower than the really might in rivers that do have significant summer fisheries and conversely exploitation rates in the autumn will appear much higher than they really are in rivers that only have autumn runs of salmon and grilse.
- 2.7 While we have not attempted to investigate this, we suggest that the effects seen at Pitlochry may also occur with some of the other counters too. For example, as far as we understand, the rivers Awe and Beaully do not have significant runs of true autumn fish and typically most fish ascend in summer in those rivers. Therefore, those two counters may also produce overinflated exploitation rates in the autumn too.
- 2.8 While, unlike the other rivers with counters used, the River North Esk does have a significant autumn run of salmon, it also has major runs in the spring and summer. Thus again, catches late in the season upstream of the counter will almost certainly include fish that crossed the counter much earlier in the season in addition to more recent entrants. That will again create an illusion that exploitation rates in the autumn are higher than they really are.
- 2.9 The combined effects of the issues described above are clearly observable in the graphs in Figure 5 in the paper. We assume these graphs represent monthly national relationships which are then used to determine monthly salmon abundance from rod catches. Then take, for example, the graph for the month of June. From visual inspection, it appears that a catch of 1,000 fish equates to a count of around 10,000. That implies an exploitation rate of around 10%. In July, however, a catch of 1,000 implies a count of just under 20,000. Assuming a figure of 17,500 gives an exploitation rate of about 6%. But, in September, a catch of 3,000 equates to a count a little under 25,000 giving an exploitation rate somewhere around 13%. In October, a catch of

3,000 equates to a count of just under 15,000, implying an exploitation rate of around 21%. The overall result of these effects is that rivers with a high summer catch will appear to have a disproportionately large salmon population, while rivers with a high autumn catch will appear less productive. It is for this reason, for example, that among the larger Scottish rivers, the Spey appears particularly productive for the size of its catch and the Tweed less productive in relation to its catch.

3. Regarding returns outwith the angling season, we have several comments to make on this section.

3.1 We suspect that the policy of Marine Scotland Science in assuming that fish which ascend the North Esk counter in December are all MSW spring salmon is one that is now well out of date. From recent experience on the Tay it is not unusual for significant numbers of fish to be caught in some years right at the start of the season on 15 January which have clearly entered the river in the very recent past but are still on the point of spawning. That assumption may have been fair at a time when there genuinely were significant runs of fresh “winter” springers, but we suspect this will not be the case today. Certainly during the period covered by these stock assessments (2011 to 2015) it would be safer to assume all fish in December are “autumn” fish rather than spring fish.

3.2 As we have explained above under Section 2) above, at least two of the counters (Awe and Beaully) used to provide data for Figure 6 in the paper are on rivers that do not have a significant autumn salmon population. The North Esk definitely does, however. Thus, as shown in Figure 6, counts in the Awe and Beaully tend to have fallen considerably before the end of the season while the North Esk count holds up in the autumn. Any extrapolation into the close season based on the Beaully or Awe will therefore indicate a small out of season run. By using an amalgam of these four counters, the result given for the Conon (Figure 8 in the paper) shows only a small out of season run and that might indeed be an accurate reflection of that river. However, we suggest that using the Conon as an example is inappropriate. The Conon is well known as a summer grilse / spring and summer salmon river only. However, there are many rivers in Scotland that have true autumn salmon populations which lack any significant spring / summer component. Those rivers (e.g. the Earn and the Eden in this district) will not be accurately reflected by this approach. We suggest something like the following may be a way forward. Firstly, for each river, the long term monthly distribution of rod catches should be considered. This will clearly show up which rivers are likely to be different from the Awe, Beaully etc and which are not. In rivers where the catch is rising as the season closes as opposed to falling and where the fish have been shown by sampling to be fresh, it may be reasonable to conclude that there may be a significant out of season run. In the long term, a model would be applied to such

rivers that is based on counters on rivers that only have late runs of fish. However, in the interim we suggest the North Esk data only should be applied. That would at least be more appropriate because the north Esk does have an autumn component, though not ideal as it has a big summer component too. We also suggest that as mentioned earlier, the December North Esk counts should be considered to be autumn fish rather than spring salmon. A further refinement that may help further might be to incorporate flows into the model. For example, it could be the case that out of season counts on the North Esk may be inversely related to flows in the weeks preceding the end of the season. We suggest it may be worthwhile comparing something like the ratio of North Esk November and December counts to October counts with say the average flow in October. A correction factor could perhaps then be produced to be applied to rod catch data from other rivers to account for dry years.

Paper entitled *The relationship between egg numbers and fish length for salmon in Scotland: Draft Report.*

Last year we raised concerns over the use of an average number of eggs per salmon created by amalgamating data from both autumn and spring fish. While we noted this might be acceptable in rivers that have more or less equal proportions of both types of fish, this approach would tend to overestimate egg deposition in rivers dominated by spring fish and under estimate egg deposition in rivers dominated by autumn fish. For example we note that from Figure 10 in the paper *The application of conservation limits for Atlantic salmon in Scotland* produced last year, the number of eggs produced by a 70cm female grilse would be about 6,000 according to the relationship used. However, we suggest that on looking at the same graph by eye, the figure, if only applied to autumn fish, would actually be around 7,500. An increase of 25%.

We were particularly concerned at the time because the two category 3 rivers in this district, the Earn and Eden, have traditionally been dominated by true autumn fish, with large autumn grilse typically being dominant – 70 cm at least historically not unusual.

Now, we note that in the latest analysis for 2017, while we welcome attempts to look in closer detail on a river basis, we continue to have concerns. Firstly, the concern raised last year does not appear to have been addressed. For example in Figure 4 on page 6 of the paper, regarding S2 grilse (dominant type in the Tay district in autumn), a fish of 70cm would again produce about 6,000 eggs according to the relationship shown. We assume that the curved lines shown on the graphs do accurately reflect the computed relationship. However, we note from Figure 3 on the previous page of the paper that the relationship for the same size of fish from the North Esk is between 7,500 and 8,000.

Unless the lines plotted in Figure 4 are not accurate (they certainly don't seem to follow the middle of the distribution of points except at smaller lengths – a more accurate level should surely be around 7,500?) we are concerned that this difference may just be an artefact of unrepresentative sampling.

We are aware that in period around 1990 when much of the North Esk samples were collected, most of the fish sampled were autumn fish. At that time, the Esk Board principally stripped autumn fish for their hatchery. On the other hand, while we do not know the exact provenance of the “Tay” fish described in this paper with certainty, reading between the lines we guess these were fish stripped at Almondbank for various purposes. These would most typically have either been fish from the River Almond, which is a late summer run river but not true autumn fish, or fish from spring salmon populations. We doubt that true autumn fish figure much if at all in the Tay samples shown in Figure 1 of the paper. Autumn fish were not much used at Almondbank to the best of our knowledge.

We caution therefore that the difference between the Tay and North Esk for a 70cm S2 grilse apparent from Figure 3 may be due to sampling fish of different spawning destination, the North Esk fish being of a later running, more fecund population.

While we appreciate there may be apparent differences in fecundity between fish of different smolt age, we caution against assuming that smolt age *per se* is the causative factor in all or even any cases. We suggest that an alternative proposition could be that the real determinant is actually run timing or rather destination of spawning, e.g. upriver or downriver. If that were the case, then smolt age may just be a label indicating where the fish came from. Generally, it is the case that early running fish in Scotland have higher mean smolt ages than late running fish, since the former tend to come from more oligotrophic headwater areas. This relationship has been well rehearsed by MSS for the North Esk for example. However, while that is often the case, it is not always so. Indeed MSS or rather DAFS as it was, pointed out long ago that early running salmon from the upper Tummel catchment tended to be derived from relatively rapid growing S2 smolts while the upper River Almond, typically a late summer grilse river, was dominated by S3s. We confirm that the pattern described by Struthers back then is indeed accurate. Indeed, we have also found that one of the earliest and most special early running Tay populations, from the River Fillan and Dochart, is also primarily rapid growing S2s.

On the basis of these concerns we recommend the following.

- 1) While we welcome investigation of different rivers, we suggest that run timing or spawning destination should be a the main factor that is taken into account. Based on demonstrated differences in egg production between spring and autumn fish adjustments should be made on the basis of the proportions of different types of fish

in a river as deduced from counts or catches. Thus for example, when in recent times the largest egg depositors in the Tay district have been autumn fish, it is not appropriate to use egg relationships based on samples that did not include autumn fish. Appropriate data should be sought to fill in these gaps.

- 2) In immediate time, at least for those parts of the Tay district where autumn fish dominate – particularly a concern on the rivers Earn and Eden – we feel it would be possible to do worse than to use the data in the all rivers graph, although remodelled. The probable skewing of the national dataset by large samples of autumn North Esk fish help to make the national set more appropriate to somewhere like the Earn for example.

Paper entitled *Egg content of individual salmon*

With regard to this paper, if as is implied by Figure 3 in the paper that new models are derived each year based on scale samples obtained each year, then Figure 3 must have been wholly derived from data from the rivers Tweed, North Esk, Dee and Spey as they are the only rivers that have provided data each year from 2011 to 2015, plus for single years the Naver and Oykel.

We also note that on page 2 of the paper it is said that “report order” was a non significant factor implying that there were no differences in the lengths of fish samples in different rivers according to sea age and date.

However, we would like clarification on whether that conclusion on report order was based purely on data relevant to the 2011 – 2015 period or whether it was derived from analysis of the much wider older, mainly netting, datasets referred to in Table 1 of the paper.

It is possible that, at a time when scale collections were almost wholly derived from net caught fish which would mostly all have arrived at the coast within a similar time period, fish should be of a similar length at a given time around the country. However, now that data are only available from rod caught fish, that stability may, we suggest, be less likely. It is more likely to still be true during the spring and early summer but, by the autumn, catches in some rivers at least may be composed of fish which have entered rivers over a long period of time and may vary considerably in size. The extent to which this might be true will depend on the dominant run types in each river. Thus, for example, there is a greater likelihood of this being a problem on the Dee say compared to the Tweed.

If this turns out to be true then data need to be obtained from a wider range of representative rivers.

Proportion female

Last year we expressed concern that the percentage female then used for grilse was 50% and that for MSW salmon 55%. We provided evidence then as to why those figures may have been very inappropriate.

Now we note that in the document titled *Salmon Conservation Regulations 2016*, we are told that on the basis of genetic analyses from 9 sites all Scotland percentages of 49.5% for grilse and 71.4% for MSW are now being used. While we think this is likely to be much closer to reality for MSW fish and perhaps grilse in autumn salmon population, we suspect that for some rivers producing both summer grilse and spring salmon 49.5% female may still be high for grilse. It would be more informative if the rivers from which these samples were taken were published, indeed even the parts of rivers and times of year the samples were obtained.

Outstanding issue – habitat quality

While as we have said we welcome the fact that progress has been made in improving the methodology in the areas described above, there are still some very significant areas within the methodology that could also be improved. In particular we also wish to reiterate the point we made last year, that if other countries (e.g England and Norway) provide corrections to conservation limits on the basis of habitat quality, then similar methodologies should be developed for Scotland too.

Finally – reports should be written in understandable language

As a final point, we are aware that probably most people who have read the various papers etc supporting the regulations find them entirely unpenetrable. We suggest that in future attempts should be made to make these documents more user friendly, bearing in mind the lay nature of many interested parties whose fisheries may be affected by these proposals. Even for people with a scientific training these papers can be difficult in parts unless the reader actually uses the types of statistical analyses involved. More plain English would not go amiss. It did not also help that during this consultation period the person in MSS seemingly most associated with these analyses has been on holiday and it has not been possible to enquire as to the finer points of some of the methodologies – in particular the new flow corrections – during the consultation period.