



Spey mainstem post spate and stocking fry counts Sept 2014

The extreme spate event that occurred in the Spey catchment on the 11th Aug 2014 caused considerable damage to infrastructure as well bankside and instream habitat. Associated with the high flows was a large scale mortality event affecting juvenile salmonids on lower river beats, and also in many tributaries. At the Spey Fishery Board (SFB) meeting of the 15th Aug 2014 it was agreed that the opportunity should be taken to taken and quantify the impact of the spate on juvenile fish populations in the Spey.

The strategy adopted for the post spate monitoring was to repeat the July 2014 timed salmon fry index surveys in the Spey mainstem and the Fiddich. A small number of Spey mainstem fry index sites had not been surveyed at the usual time during July therefore the opportunity was also taken to collect data from these sites for the first time this year. All fish captured were anaesthetised, identified, measured and recorded.

At the same (SFB) meeting of the 15th Aug 2014 it was agreed that the 50,000 lower Spey 0+ salmon parr held in the Sandbank hatchery should be stocked back into the lower mainstem. These fish had original been intended for mitigation stocking into lower catchment tributaries. It was agreed that the mainstem stocking would be monitored. This was facilitated by removal of the adipose fin by clipping, allowing future identification of stocked fish.

The hatchery fish were fin clipped by ghillies and volunteers during the last week of August and stocked out the following week. The fin-clipped fry were stocked in the mainstem in four defined areas; Craigellachie, Easter Elchies, Delfur and the middle Brae beats.

If fin-clipped salmon fry were recorded during the surveys they were not included in the post spate monitoring results below, these results therefore reflect the status of the wild fry population only. The fin-clipped fry counts are reported in the stocking monitoring section below.

Results: Post spate monitoring

The results of the July and Sept mainstem surveys are shown in the established reporting format in the table below. It should be noted that all results are colour coded in accordance with the breakpoints for all salmon fry index surveys completed in the Spey catchment during the three year period 2012-2014 (Appendix A). Full details of the revised salmon fry index and breakpoints will be published in the 2014 Spey electrofishing report.

Table 1: Results from the pre (July) and post (Sept) spate Spey mainstem salmon fry index surveys. Results are expressed as salmon fry/min and colour coded in accordance with the Spey timed surveys classification system.

Site code	Location	July Salmon fry/min	Sept Salmon fry/min
S007R1	Essil Pool	16.3	10.0
S017L2	Brae 5	24.7	6.0
S019L2	Brae 4	28.7	27.0
S025L1	Brae 2	23.0	22.0
S034R1	Delfur B o'B	55.0	9.3
S040L2	Delfur	66.0	20.0
S056L1	E.Elchies	43.7	29.7
S079R1	C&L	31.3	36.6
S087L1	Phones	6.0	7.3
S105L2	Tulchan D	33.7	20.3
S141L1	Castle Grant 1	9.3	13.3
Mean		30.7	18.3

Table 2: Results from the pre and post spate River Fiddich salmon fry index surveys. Results are expressed as salmon fry/min and colour coded in accordance with the Spey timed surveys classification system.

Site code	Location	July Salmon fry/min	Sept Salmon fry/min
TSF01	Fiddichside Inn	107.3	33.7
TSF13	Balvenie warehouses	25.0	29.0
TSF19	Dullan confluence	129.7	22.3
TSF38	Bridgehaugh	29.0	13.3
Mean		72.8	24.6

The results show that there were statistically significant declines ($p = 0.02$, *student t-test*) in the salmon fry counts overall in both rivers, although fry counts increased in four sites. The change in the pre and post spate classifications were of one class or less except for two sites, S017L2 and S034L2, where the classification dropped by four classes (e.g. excellent to low). It should be noted that the mean results for all Spey mainstem salmon fry count surveys completed in 2014 was 18.9 salmon fry per min.

The two graphs below show the percentage change in the salmon fry counts in the Spey and Fiddich in comparison to the counts obtained during the original July 2014 surveys. For the Spey mainstem sites the impact on salmon fry counts appeared to greater in a downstream direction.

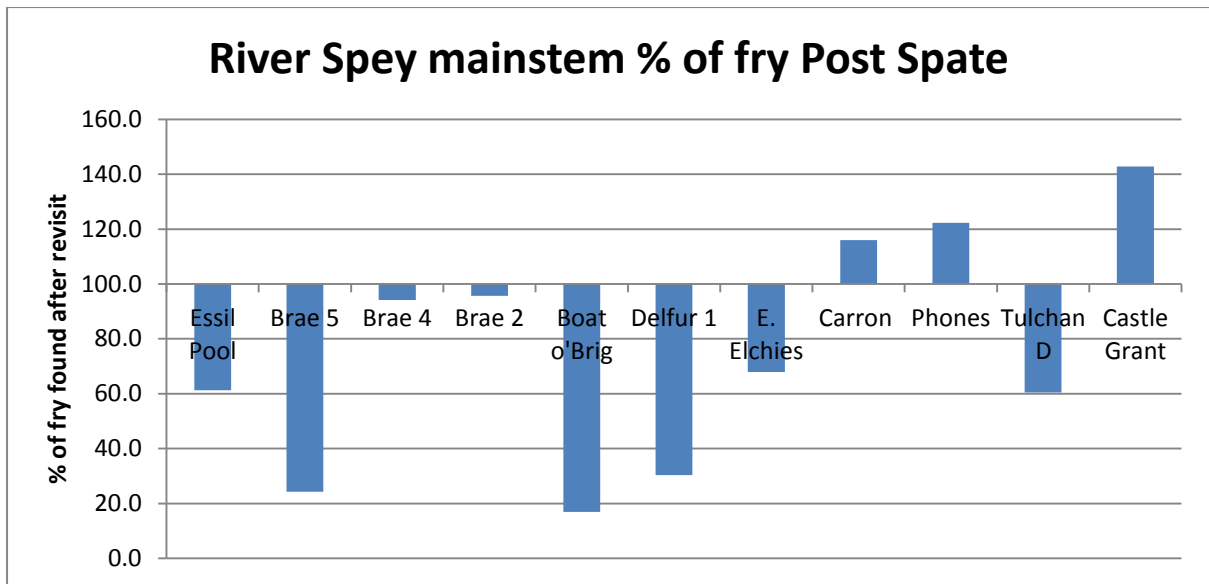


Figure 1: Percentage change in River Spey Sept salmon fry counts compared to July 2014 surveys

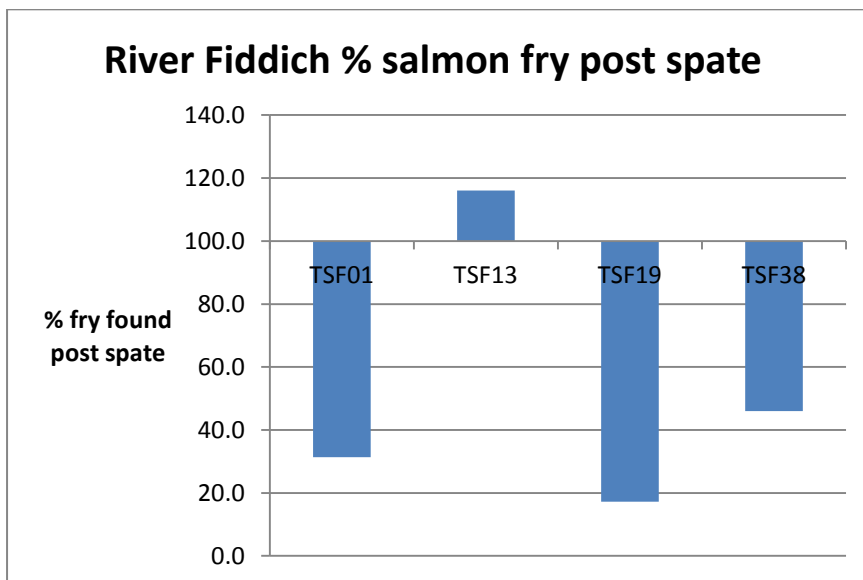


Figure 2: Percentage change in River Fiddich salmon fry counts compared to July 2014 surveys

Although the salmon fry index surveys primarily target the type of habitat frequented by fry, salmon parr are also caught. The graphs below show the comparative catches of parr during the original July surveys and the repeat September surveys. It should be noted that with the lower numbers involved for the parr counts small changes can result in large percentage swings.

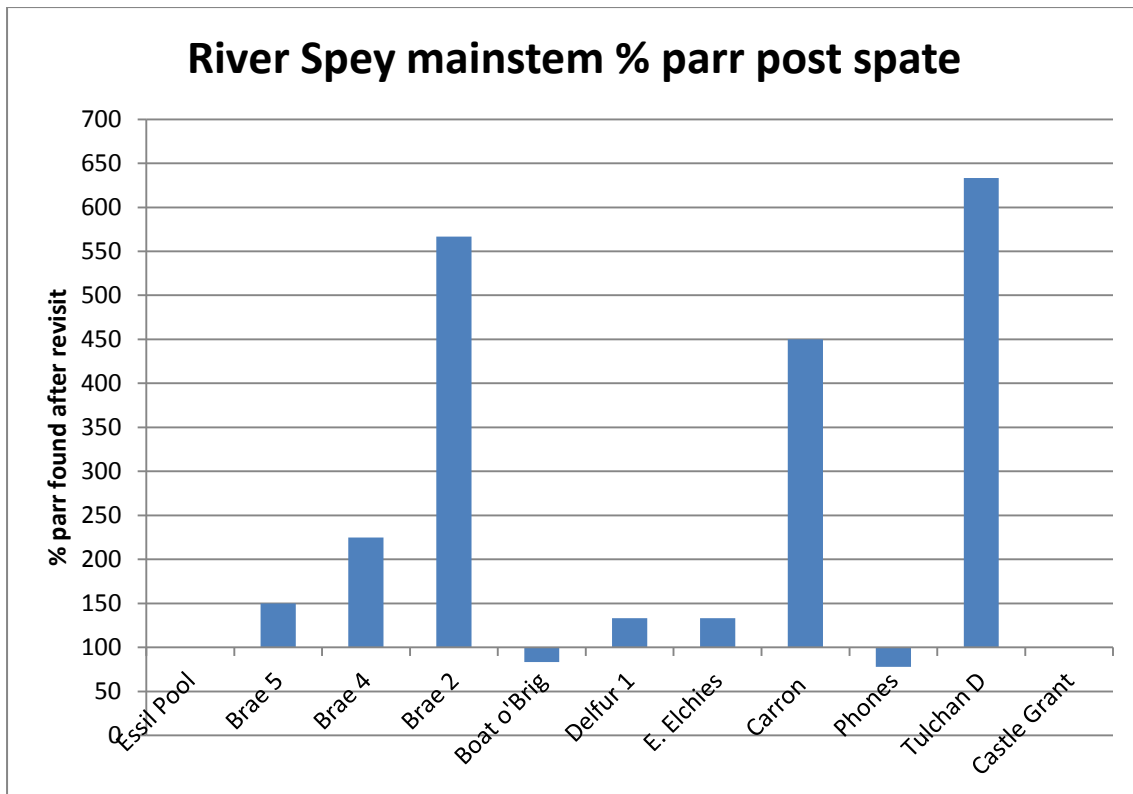


Figure 3: Percentage change in River Spey salmon parr counts compared to July 2014 surveys

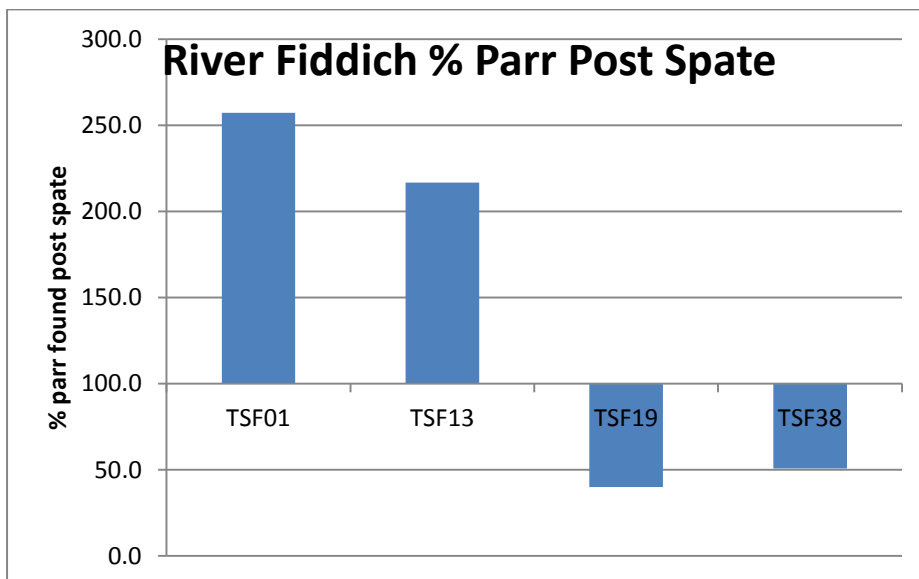


Figure 4: Percentage change in River Fiddich salmon parr counts compared to counts during July 2014 surveys

Parr numbers increased overall although there was no significant difference between the parr counts pre and post spate.

The average size of the Spey salmon fry during the September surveys were approximately 4mm larger than that recorded two months earlier in the July surveys. In the Fiddich the growth increment for the salmon fry was only 1mm and it had decreased by 4mm at one site.

The full results for salmon fry and parr caught per minute during the original and repeat surveys are shown in Appendix B below.

Results: Stocking monitoring

During the repeat Spey mainstem surveys each fry captured was carefully examined to establish if it had been adipose fin-clipped or not. The results of this monitoring are shown in the graph below. The sites included were all either stocked or were in close proximity to upstream stocking.

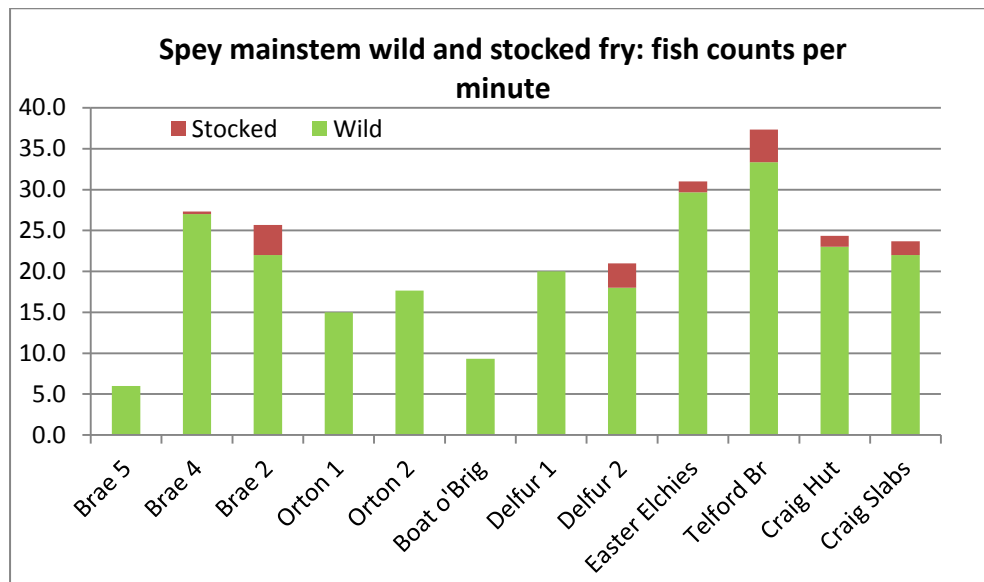


Figure 5: Salmon fry counts per minute from stocking monitoring sites in Sept 2014

Fin-clipped salmon fry were found at seven of the sites listed above. All the Craigellachie sites (Telford Br/Craig Hut/Craig Slabs), Easter Elchies, Delfur 1 & 2 and Brae 2 survey sites were in parts of the river where stocking had occurred. Stocked fry were found in all of these sites with the exception of Delfur 1. The maximum contribution from stocked fry was 14.3% in two sites and the average contribution in sites where stocked fry were recorded was 8.2%.

There was little evidence of movement of the stocked fry. The only site where stocked fry were found in out with an area that had been stocked was at the Brae 4 site where a single stocked fry was recorded approximately 1km downstream of the nearest stocked location.

At all sites downstream of and including Delfur, the average size of the stocked fry captured during the post spate monitoring were smaller than the wild fry. Further upstream at the Easter Elchies and Craigellachie sites the sizes of the wild and stocked fry were comparable.

Discussion

Whilst the repeat surveys in the mainstem and Fiddich post-spate monitoring showed an overall decline in salmon fry counts there were still reasonable numbers of fry and parr at most sites. The results were highly variable with the classification at two sites in the lower Spey mainstem showing a drop of four classes. These two sites were in parts of the river where there was evidence of considerable gravel mobility during the recent spate. At sites where the river channel and substrate were considered stable the magnitude of the changes in salmon fry counts were lower.

Salmon parr counts were higher in the repeat surveys although not statistically significant overall.

The growth increment in the salmon fry sizes was considered low considering the length of the elapsed time between the original and repeat surveys. Previous data from Craigellachie had found a 10mm growth increment in a four week period at a similar time of year, compared to approximately 4mm in an eight week period in this instance.

There was evidence of downstream displacement of juvenile fish, particularly from the Fiddich survey results. The Fiddich is affected by thermal pollution from Dufftown downstream due to distillery cooling water inputs. As a consequence the fry downstream of Dufftown are normally larger on average than those upstream. The July 2014 Fiddich salmon fry surveys found that the fry downstream of Dufftown were 12mm (25%) larger than those present in the closest site upstream of Dufftown. During the repeat surveys in Sept the mean size of the salmon fry found at the Balvenie site in the Fiddich were 4mm smaller than in July. The most plausible explanation is downstream migration of smaller fry from upstream of the thermal inputs.

In addition to the repeat surveys presented above a number of other sites were surveyed for the first time in 2014 during September. These results are presented in Table 3 below. The mean fry counts from these sites are not significantly different to the 2013 results although in the case of the Craigellachie and Aberlour sites the fry counts were amongst the highest recorded over the last three years. The Orton sites have been highly variable. The overall parr counts at these sites were comparable with those recorded in 2013 despite the loss of ranunculus cover at some sites.

Table3: Salmon fry index results from sites surveyed for the first time in 2014 during September. Results are expressed as numbers per minute.

Site code	Location	2012	2013	2014
S029L1	Orton Water	6.3	41.0	15.0
S032L1	Orton Water	9.0	44.0	17.7
S059R1	Craigellachie	36.7	28.3	33.3
S060R1	Craigellachie	13.0	12.3	23.0
S061R1	Craigellachie	20.3	12.3	22.0
S066R1	Aberlour	10.0	15.3	27.7
Mean		15.9	25.6	23.1

Summary

- Post spate monitoring showed that whilst salmon fry counts had declined overall there were still fry present at all sites with greater impact recorded in more unstable riverbed areas
- Salmon parr counts increased overall, although not significantly, with only two sites exhibiting small reductions in parr counts
- There is evidence of downstream migration of salmon fry and parr, a natural phenomenon that could provide mitigation against losses sustained during extreme spate events.
- The fin-clipping was an effective method by which stocked fish could be identified.
- The mainstem stocking had limited impact overall on fry counts even at sites directly stocked two weeks previously.
- The losses incurred during the spate event are likely to have an overall negative impact on smolt production in 2015.

Acknowledgements

The contribution of SFB staff, Spey ghillies and other volunteers in fin-clipping the fry prior to stocking is acknowledged. The assessment of the mainstem stocking would not have been possible without this identification mark on the stocked fish. Thanks to the Spey Foundation staff for carrying out the surveys with such diligence, with particular thanks to seasonal assistant Kirsteen Macdonald who did much of the data processing and analysis.

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Nov 2014

Appendix A

Table 4: Spey timed electrofishing breakpoints 2012-2014

Class	Breakpoint (Salmon fry/min)
Very good	>31.5
Good	= or >19
Moderate	= or >12.0
Low	= or >6.0
Very Low	<6.0
Absent	0.0

Appendix B

Table 5: Pre and post spate salmon fry and parr counts from repeat Spey mainstem and Fiddich surveys 2014

Site	July		September	
	Salmon fry/min	Salmon parr/min	Salmon fry/min	Salmon parr/min
Essil Pool	16.3	2.3	10.0	2.3
Brae 5	24.7	0.7	6.0	1.0
Brae 4	28.7	4.0	27.0	9.0
Brae 2	23.0	1.3	22.0	5.7
Boat o' Brig	55.0	4.0	9.3	3.3
Delfur 1	66.0	1.0	20.0	1.3
E. Elchies	43.7	1.0	29.7	1.3
Carron	31.3	1.3	36.3	6.0
Phones	6.0	6.3	7.3	4.7
Tulchan D	33.7	1.0	20.3	6.3
Castle Grant	9.3	2.0	13.3	2.0
TSF01	107.3	2.3	33.7	6.0
TSF13	25.0	2.0	29.0	4.3
TSF19	129.7	13.3	22.3	5.3
TSF38	29.0	19.6	13.3	10.0
Mean	41.9	4.1	20.0	4.6