



# The River Dee Trust

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## Scale Sampling Report, Spring 2009

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### Summary

- Scale samples from adult salmon and trout captured on the River Dee were obtained by ghillies and angling club representatives between 2<sup>nd</sup> February and 31<sup>st</sup> May 2009 and analysed by the River Dee Trust. Scales were collected from a total of 207 salmon, 104 salmon kelts, 22 sea trout, 6 sea trout kelts and 1 brown trout.
- Three quarters (73%) of the salmon sampled were 2 Sea Winter (SW) fish and nearly one quarter (24%) were 3 SW fish. 2.4% of the fish sampled were repeat spawners. Only one sample (0.5%) could not be aged due to scale regeneration. No grilse (1 SW) were sampled.
- In total, 70% of the Spring salmon had spent 2 years in freshwater (FW) before migrating to sea as smolts and the remaining 30% had spent 3 FW years prior to smolting.
- 2 SW fish ranged in size from 20 – 33” in length and 4 – 14 lb in weight (on average, 28” and 8 lb). 3 SW salmon were significantly larger and ranged in size from 28 – 39.5” and 9 – 26 lb (average of 33.5” and 15 lb).
- There were significantly more (almost double) 3 SW salmon in the Spring 2009 sampled rod catch compared to the Spring 2008 sample; this was largely due to more 3 SW fish in the March and May 2009 samples. However, size of 3 SW fish was significantly smaller in Spring 2009 compared to Spring 2008.
- Five salmon (all captured in February) were repeat spawners. All five fish spawned for their first time as 2 SW fish in 2007.
- Equal proportions of rod-caught salmon kelts had spawned as grilse (49%) or as 2 SW (49%) fish. Only 2% had spawned as 3 SW fish. Two kelts (2%) had spawned in 2008 for their second time.
- Two thirds of the sampled sea trout were 2 SW fish and the remainder were 1 SW fish. All 1 SW sea trout showed significant growth since Winter 2008. None had spawned previously.

## **Introduction**

This report presents findings of scale sampling conducted within the Dee rod fishery between 2<sup>nd</sup> February and 31<sup>st</sup> May 2009 (Spring period). This is part of a River Dee Trust (RDT) scale programme started in 2008; two previous reports presented findings from scale samples obtained in Spring and Summer/Autumn 2008.

The aim of this study is to determine the age composition of salmon and sea trout in the Dee's rod fishery. In addition, scales have provided insight into the frequency with which salmon and sea trout repeat spawn and also highlight growth patterns of fish whilst at sea. The scale sampling provides an unbiased sample of the rod fishery, achieved by ghillies sampling fish strategically (every 2<sup>nd</sup> – every 6<sup>th</sup> fish landed, or the subsequent fish landed at which the ghillie was present). Above all, this avoided any 'choice' in which fish to sample. The participating beats are spread along the length of the Dee.

In terms of ageing fish by their scales, Spring salmon are fish that have entered the river before any faster ('summer') growth occurs in the sea after their final sea winter (SW). Spring fish have always spent at least two winters at sea. 'Summer salmon' are fish that have spent at least two winters at sea and have resumed summer growth at sea in their final year before re-entering the river. It is possible that Summer salmon may appear in the fishery before 31<sup>st</sup> May.

The remainder of this report is in two sections. The first section summarises the information collected from all beats along the river and compares age structures of fish caught at the different locations. The second section provides detailed information of individual fish captured at the ghillie's beat(s).

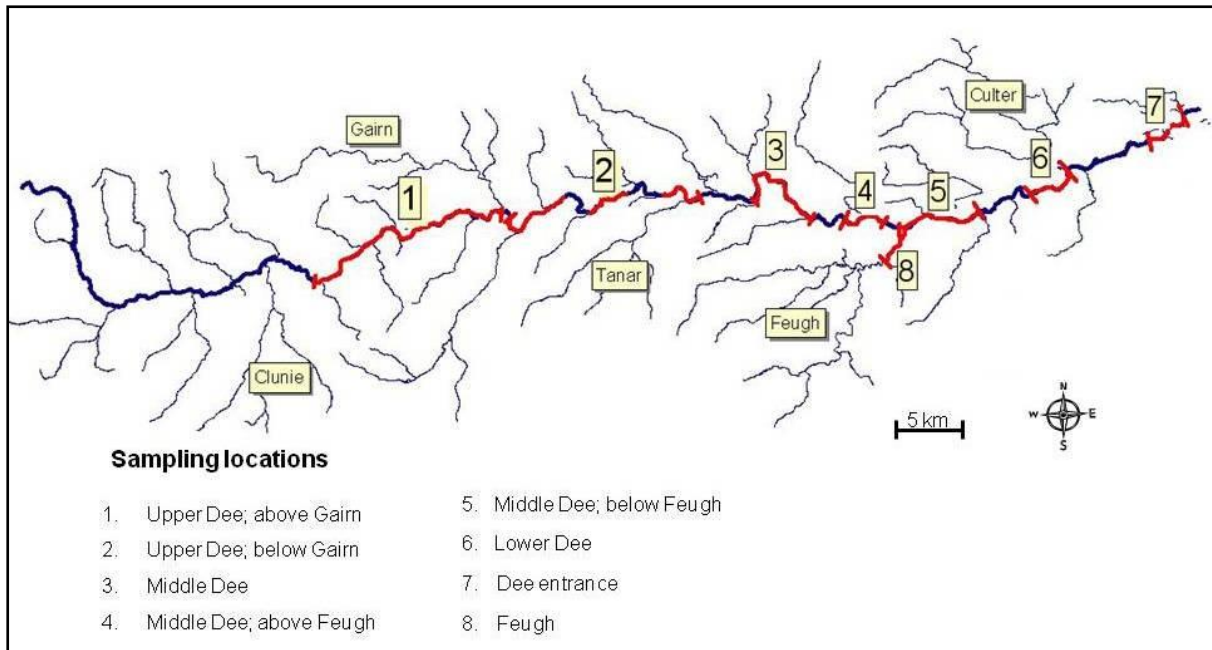
## **SECTION 1**

### **Location**

The scale sampling was carried out in eight locations (Fig. 1):

1. Upper Dee, above Gairn tributary (Crathie, Lower Invercauld, Ballater Angling Association)
2. Upper Dee, below Gairn tributary (Monaltrie, Ballater Angling Association, Aboyne Castle)
3. Middle Dee (Upper & Lower Dess, Kincardine & Borrowston, Ballogie & Carlogie)
4. Middle Dee above Feugh tributary (Middle Blackhall, Little Blackhall & Inchmarlo)
5. Lower Dee, below/surrounding Feugh (Banchory, Invery, Crathes, Lower Crathes & West Durris)
6. Lower Dee (Park, Upper Drum & Lower Durris, Middle Drum, Tilbouries, Altries)
7. Dee entrance (Aberdeen & District Angling Association)
8. Feugh tributary

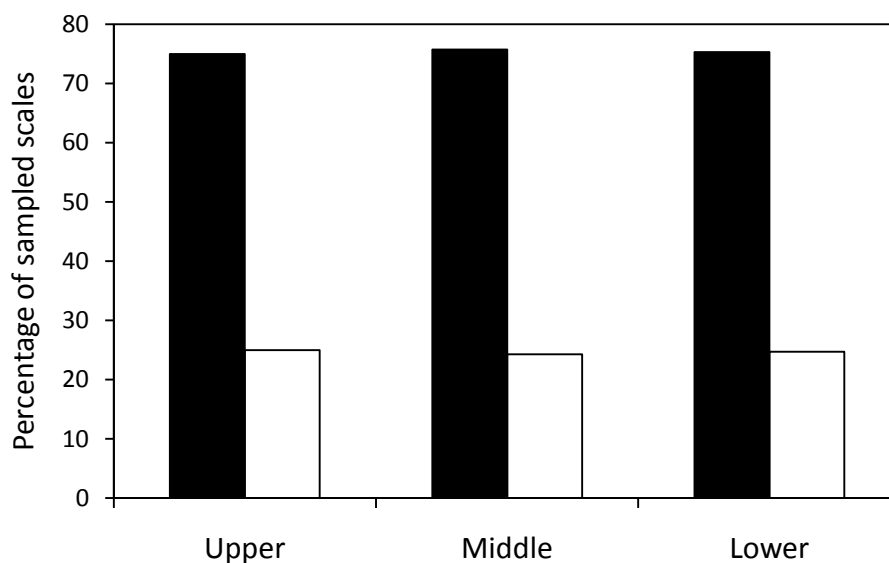
In the following text, the Upper river includes locations 1 and 2, the Middle river includes locations 3 and 4 and the Lower river includes locations 5 and 6. Note, no scales were received from locations 7 and 8 in this Spring period.



**Figure 1.** Locations of scale sampling, highlighted in red.

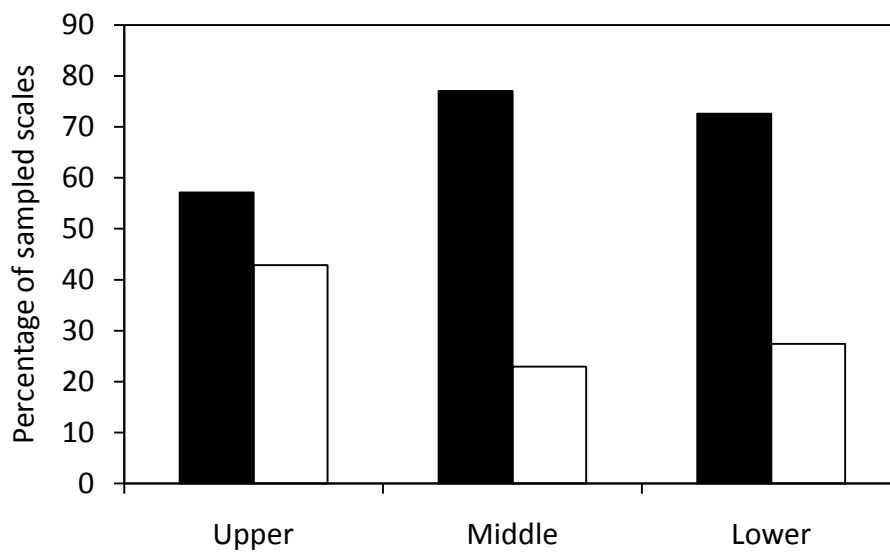
2 SW salmon comprised approximately three quarters of the Spring 2009 samples and 3 SW salmon comprised one quarter of the 2009 samples. There was no statistical difference in the proportion of the catch that was 2 SW salmon (75-77%) or 3 SW salmon (23-25%) for the Upper, Middle and Lower River sections (Fig. 2).

3 SW salmon comprised a significantly greater proportion (almost double) of the total salmon sampled in Spring 2009 compared to Spring 2008 (as determined with statistical tests).



**Figure 2.** Percentage of sampled rod catch in the Upper, Middle and Lower River Dee sections that were 2 SW (■) and 3 SW (□) salmon.

There was a trend for salmon to have smolted (migrated to sea when juveniles) at a later age in the Upper river compared to the Middle and Lower river: 43% of salmon caught in the Upper Dee had smolted after 3 years in freshwater (FW) (with the remainder having smolted after 2 FW years) whereas, of the salmon sampled from the Middle and Lower Dee, only 23 and 27%, respectively, had smolted after 3 FW years (with the remainder smolting at 2 FW years; Fig. 3). However, this difference in proportion of 3 year old smolts was not significantly different (as determined by statistical tests). In contrast, the proportion of salmon that had smolted after 3 FW years was significantly greater in the Upper River in Spring 2008.

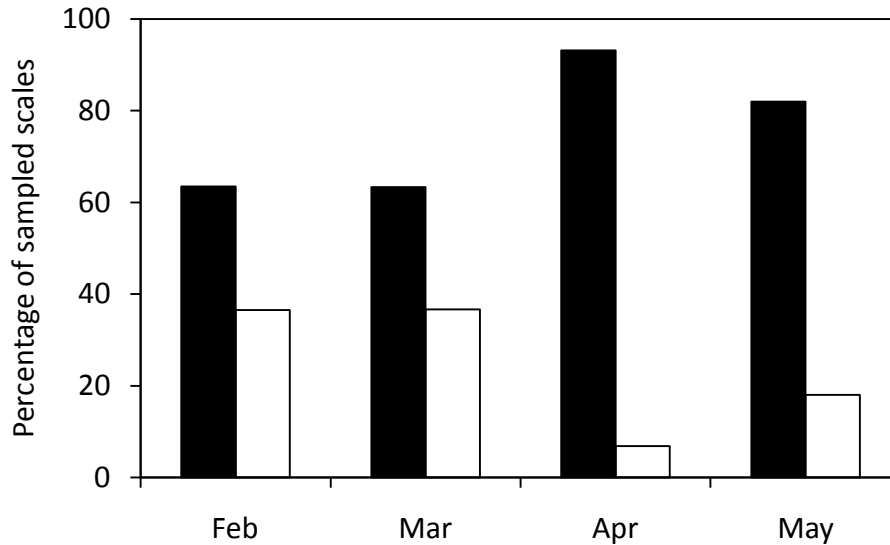


**Figure 3.** Percentage of sampled rod catch in the Upper, Middle and Lower River Dee that had smolted after 2 FW (■) and 3 FW (□) years.

### Month of Capture

Significantly more of the salmon sampled in February and March 2009 were 3 SW fish (38 and 37% of total sample in each month, respectively) compared to the months of April and May (3 SW fish comprised 7% and 18% of month's samples, respectively; Fig. 4) (as determined by statistical tests).

In both 2008 and 2009 3 SW salmon were at their greatest abundance in the rod catch sample in the month of February. In 2008, the proportion of 3 SW salmon in the March (15%) and May (2%) rod catch was significantly lower than in March/May 2009.



**Figure 4.** Percentage of the sampled rod catch that was 2 SW (■) and 3 SW (□) salmon in Spring 2009.

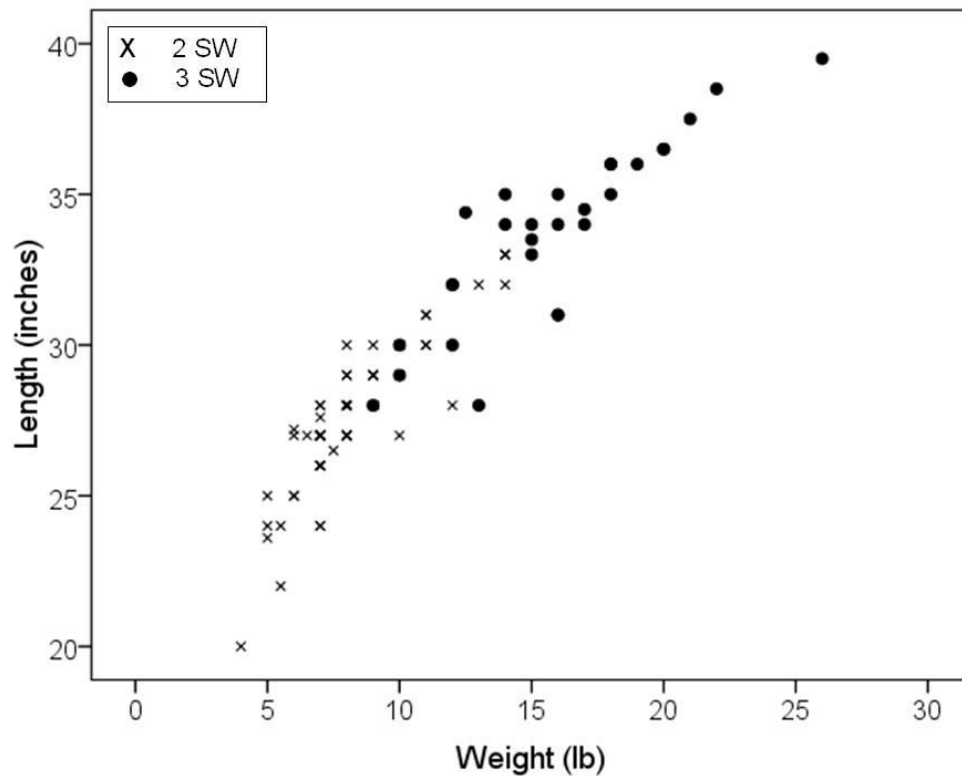
The proportion of the sampled salmon in each Spring month that had smolted after 2 FW and 3 FW years was similar (as determined by statistical tests), with approximately two thirds (64-78%) of fish having smolted after 2 FW years in each month and the remainder having smolting after 3 FW years.

Six salmon (3% of total Spring salmon; all 2 SW) showed ‘Summer growth’ (they had resumed fast growth at sea for a short period before entering the river). One of these salmon was caught in April and the other five were caught in May. These fish represent the start of the Dee’s ‘Summer salmon’ run.

### Salmon Growth

2 SW salmon (having entered the sea in Spring 2007) ranged in size from 20 – 33” (50 – 83cm) length, 4 – 14lb weight and averaged 28” (70cm), 8 lb (N.B. this excludes fish with summer growth). 3 SW salmon (having entered the sea in Spring 2006) were significantly larger than 2 SW fish – 3 SW salmon ranged from 28 – 39.5” (70 – 99cm), 9 – 26lb and averaged 33.5” (84cm), 15 lb. However, there was some overlap in sizes of 2 SW and 3 SW fish (Fig. 5). In particular, there were some small 3 SW salmon (between 9 and 13 lb).

The length and weight of 2SW and 3SW salmon did not vary between Spring months (as determined statistically). This is unsurprising given that growth of salmon at sea is much reduced during the winter period and generally faster (‘summer’) growth will not resume until May/June.

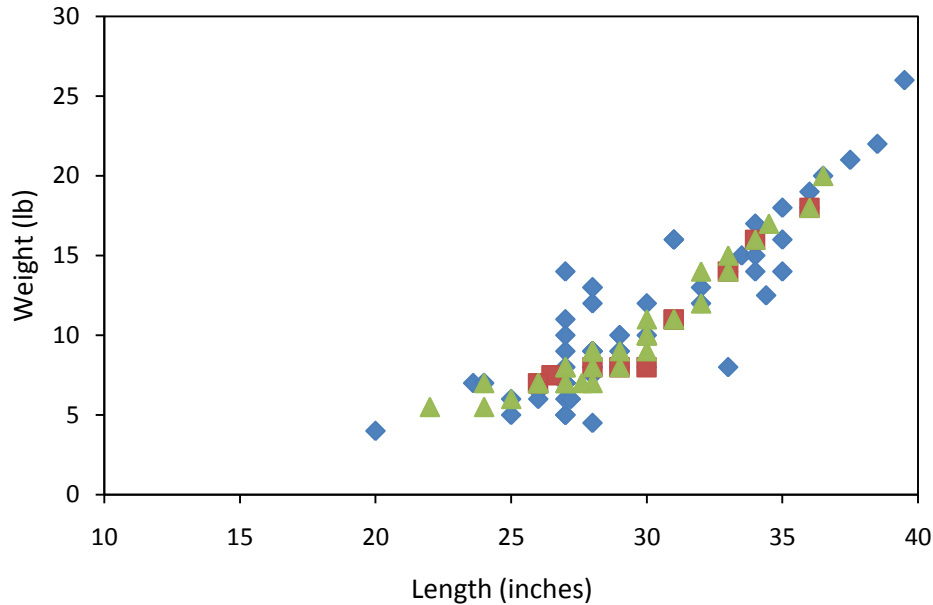


**Figure 5.** Relationship between length (inches) and weight (lb) of 2 SW (X) and 3 SW (●) salmon.

Size (length and weight) of 2 SW salmon sampled in 2009 were similar to salmon sampled in Spring 2008 (i.e. there was no statistical difference). However, 3 SW salmon were significantly smaller in Spring 2009 compared to Spring 2008 (determined by statistical tests), with 2009 3 SW salmon being, on average, 1.4" shorter and 2.2 lb lighter than 3 SW salmon in 2008.

'Growth checks' (marks on the scale that indicate periods of slow growth when fast (summer) growth at sea should be occurring) have become more frequent in occurrence in recent years. 76% of salmon sampled in this Spring period showed one or more small/severe growth checks on their scales. A smaller proportion of salmon showed evidence of multiple growth checks (36%) and fewer showed severe growth checks (10%). Of the fish showing evidence of severe growth checks, the majority (67%) occurred in Summer 2007. There was no significant difference in the extent of growth checks of rod caught salmon in different months.

There was no difference in the size (length or weight) or the condition (weight relative to length) of 2SW or 3SW salmon with severe checks or multiple checks compared to other sampled fish (i.e. fish with none or one check; Fig. 6). This result is surprising (though concurs with the Summer/Autumn 2008 scale sampling) as the scales provide strong evidence that fish had reduced growth for a period of time at sea. It is therefore possible that such fish were able to make compensatory 'catch up' growth, or that fish without evidence of severe/multiple checks were nonetheless not attaining maximum growth.



**Figure 6.** Relationship between length and weight (i.e. condition) of salmon with severe growth checks (■), multiple growth checks (▲) or no/one growth check (◆).

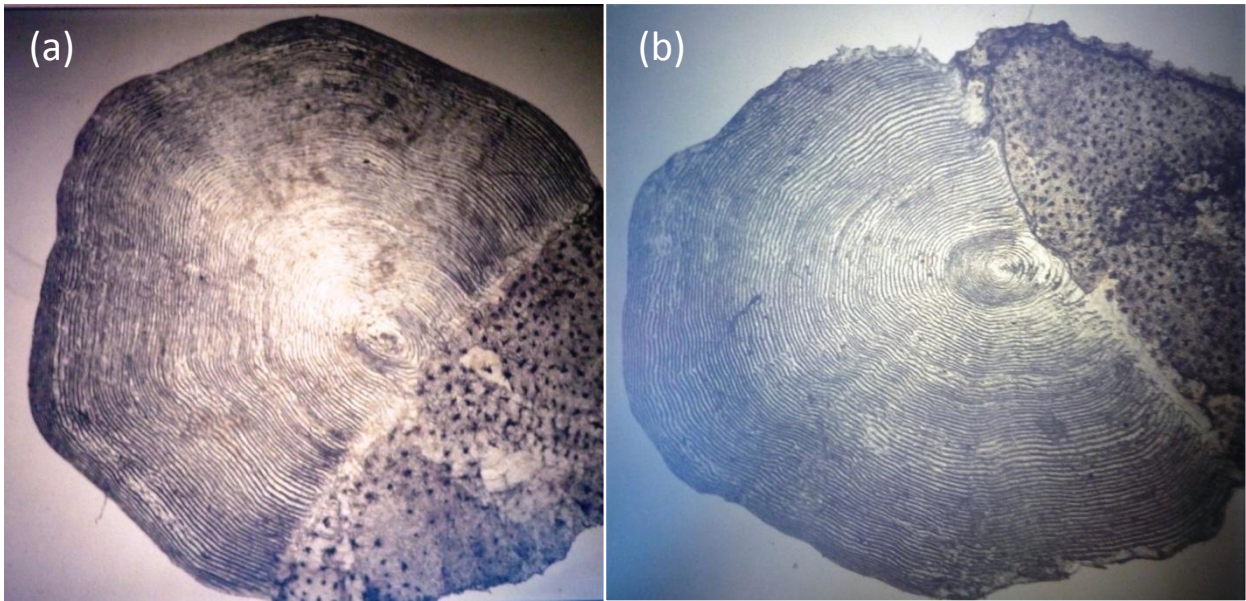
### Repeat Spawners

2.4% of the salmon sampled were repeat spawners. All five fish initially migrated to sea as smolts in Spring 2005, spent two winters at sea and entered the river to spawn for the first time in 2007. All five fish were caught in February 09 and would have spent (approximately) a full year at sea since their first spawning.

4% of the Spring 2008 sample were repeat spawners (not statistically greater than the proportion found in 2009). Similar to 2009, the 2008 repeat spawners were predominantly 2 SW fish (7 out of 8) at the time of their first spawning and most (5 out of 8) were sampled in February. Likewise, all 2008 repeat spawners had spent (approximately) a full year at sea before returning to the river a second time.

### Kelts

Kelt identification based on scales is related to the amount of erosion on the scale. Erosion of the scales occurs as fish re-absorb the calcium in the scales, which occurs once the fish stop feeding. The erosion becomes particularly severe as the fish develop (physiologically and physically) for spawning (Fig. 7), as their requirement for calcium increases further (e.g. it is used in the development of the male kype). However, this basis for identification of kelts is that the fish develops in readiness for spawning, but it cannot confirm if the fish actually does spawn. Hence, scales cannot distinguish between a kelt and a 'baggot'. This differentiation is best made by observation of the fish's vent.



**Figure 7.** (a) A scale from a fresh 2+ SW female salmon, captured in October 08. (b) A scale from the same fish when re-captured as a kelt in February 09 (this fish had been radio tagged). Note the erosion on the edge of the scale in (b).

104 salmon kelts were sampled between Feb and Apr 2009. Of these, equal numbers of fish had spawned as grilse (1SW; 49%) and as 2 SW fish (49%). The remaining 2% had spawned as 3 SW fish.

Approximately two thirds of kelts (61%) had smolted after 2 FW years and one third (34%) after 3 FW years. There were also four kelts (5%) that had smolted after only 1 FW year.

Two kelts (2%) were repeat spawners, both having spawned in 2007 (after spending 2 winters at sea) and again in last winter. These two fish would have entered the sea as smolts in 2005 and been laid as eggs in 2001/2.

### Sea trout

Scales from 22 sea trout were obtained, the earliest being caught on 20<sup>th</sup> April. Sea trout were 1 SW fish (32%) and 2 SW fish (68%). All 1 SW fish and one 2 SW fish had undergone further growth at sea in 2009 (i.e. 'Summer' growth). None of the 22 sea trout had spawned previously.

Sea trout were 12 – 21" length (average of 18"), 1 – 3 lb in weight (average of 2lb). There was no statistically significant difference in size of 1SW and 2SW sea trout.

56% of sea trout were 2 FW years at smolting and the remaining 44% were aged 3 FW years.

Six sea trout kelts were also sampled. All six fish had spawned for their first time after spending 1 winter at sea. Four of these fish, however, spawned for their first time in 2007 and thus have now spawned twice.

**Brown trout**

One brown trout (from Deecastle) was sampled. The fish was 13" / 10oz and was 5 years old.

## Acknowledgements

We are very grateful to the following ghillies and angling club representatives for collecting scales from the fish:

- Willie Banks (Tilbouries)
- Shane Christie (Middle Drum)
- Alex Coutts (Aboyne Castle)
- Cleve Cowie (Crathes Castle)
- Keith Cromar (Park)
- Colin Espie (Deecastle)
- Robert Fettes (Lower Crathes & West Durriss)
- Kevin Fleming (Altries & Lower Drum)
- Stuart Fleming (Aberdeen & District Angling Association)
- David Gibbon (Middle Blackhall)
- Robert Harper (Lower Crathes & West Durriss)
- Archie Hay (Crathie)
- Martin Hayward (Little Blackhall & Inchmarlo)
- Martin Holroyd (Ballater Angling Association)
- Mike Maughan (Feugh)
- John McGinley (Kincardine & Borrowston)
- Ian Murray (Monaltrie & Lower Invercauld)
- David Murray (Monaltrie & Lower Invercauld)
- Jim Paton (Upper Drum & Lower Durriss)
- Terry Paton (Little Blackhall & Inchmarlo)
- Walter Raitt (Banchory)
- Karl Revel (Invery)
- Brian Sim (Crathes Castle)
- Colin Simpson (Upper & Lower Dess)
- Sean Stanton (Ballogie & Carlogie)
- Jim Turnbull (Invery)

We are also very grateful to Bryce Whyte (FRS Montrose), Iain McLaren (FRS Pitlochry) and Dave Stewart (FRS Pitlochry) for helping us with 'tricky' scales, including repeat spawning fish and to Julian MacLean (FRS Montrose) for advice on setting up the scale sampling programme.

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