



# The River Dee Trust

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## Scale Sampling Report, Spring 2008

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### Summary

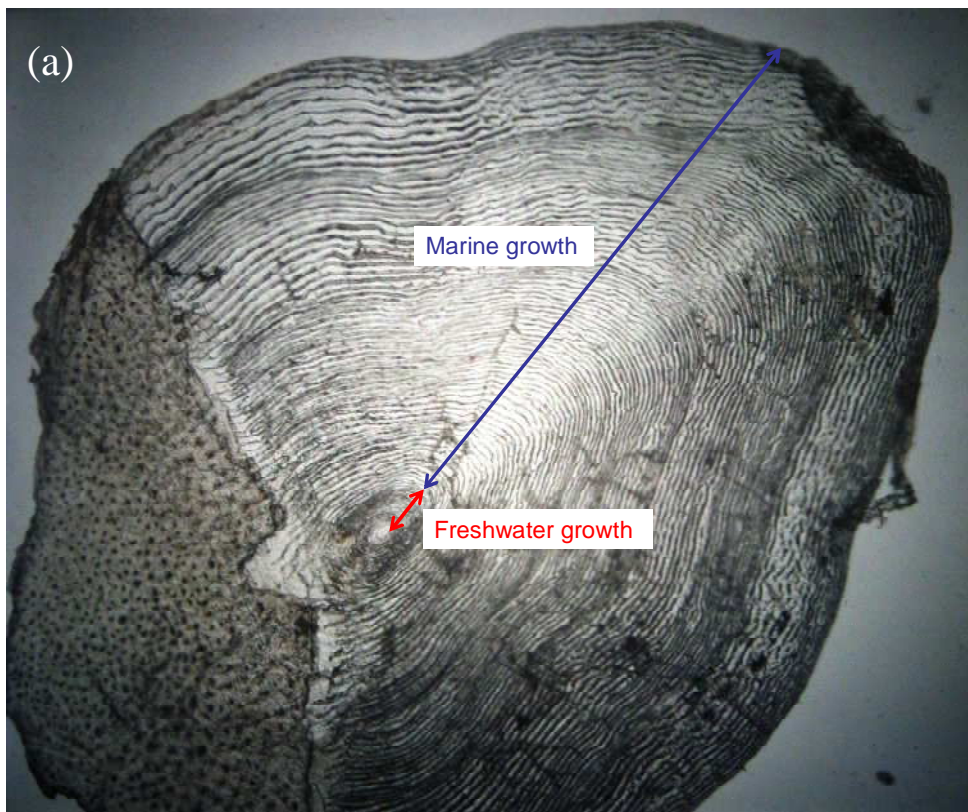
- Scale samples from adult salmon and trout captured on the River Dee were obtained by ghillies and angling club representatives between 1<sup>st</sup> Feb and 31<sup>st</sup> May 2008 and analysed by the River Dee Trust.
- Scales were collected from a total of 227 salmon and 100 salmon kelts. Scales from three sea trout, five sea trout kelts and three brown trout were also collected.
- Of the 227 salmon sampled, one was a 1 Sea Winter (SW) fish (i.e. a grilse), 191 (84%) were 2 SW salmon, 27 (12%) were 3 SW salmon and 8 (4%) were repeat spawners.
- The eight repeat spawners were fish that had entered the river for the first time and spawned in 2006, then successfully returned to sea before re-entering the river in Spring 2008. Seven of these fish had been 2 SW fish at the time of their first spawning and one had been a 3 SW fish.
- 64.5% salmon had spent 2 years in the river before migrating to sea as smolts and 35.5% had spent 3 years before 'smolting'. Significantly more salmon in the Upper Dee had smolted at 3 years compared to the Middle and Lower Dee.
- The age at smolting did not influence whether the salmon became a 2 SW or 3 SW fish – 88% of 2 year old smolts and 88% of 3 year old smolts became 2 SW salmon.
- 3 SW salmon were significantly larger (length and weight) than 2 SW salmon, although there was some overlap in their size distribution; in particular, there were a few large 2 SW salmon.
- 59% of the salmon kelts had spawned as grilse and 41% as 2 SW salmon.
- The three sea trout in the sample were caught in May and had all spent one winter at sea.
- The three brown trout were between 2.25 and 3.75 lb and were 6-9 years old.

## Introduction

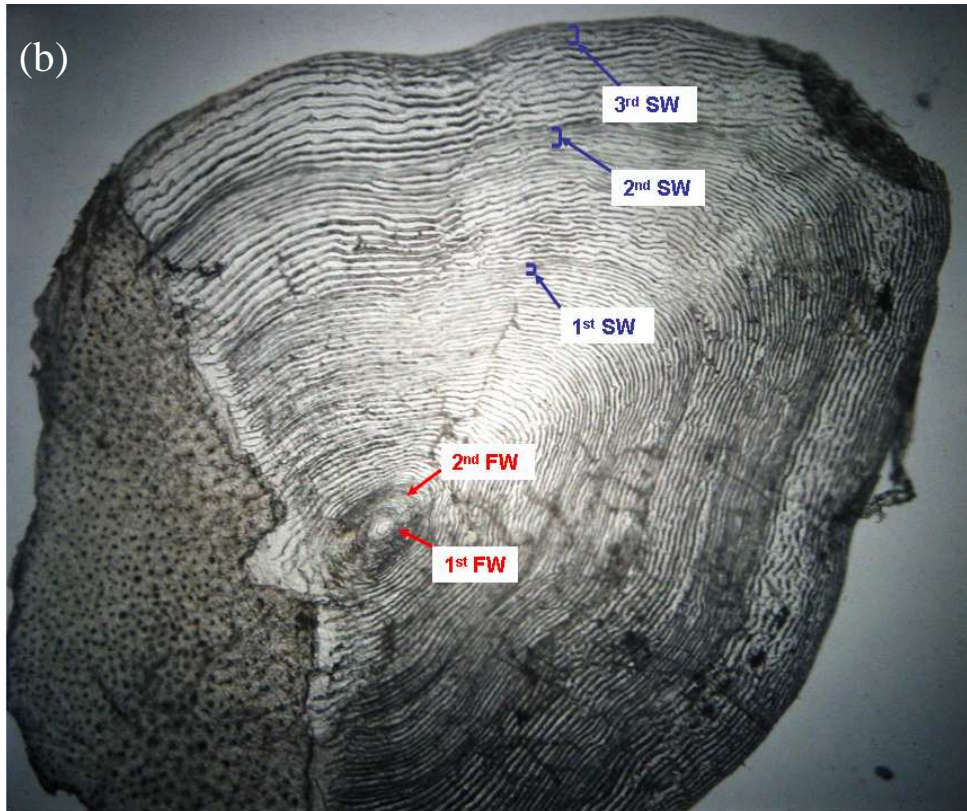
The scale sampling programme has been set up by the River Dee Trust because the markings on salmon, sea trout and brown trout scales provide information on the age and growth patterns of these fish. The programme is intended to establish baseline data on the age structures of the Dee fish populations and to monitor any changes in the growth patterns between years.

Scottish salmon spend an average of 2-3 years in the river after hatching from eggs. In the spring of their 2<sup>nd</sup> or 3<sup>rd</sup> year they migrate to sea as smolts. All salmon spend at least the summer and first winter at sea. Some fish return to the river after this first winter and these fish are grilse (i.e. 1 Sea Winter (SW) salmon). Others remain at sea for a further 1 or 2 winters (2 or 3 SW salmon, respectively), before returning to the river. Salmon that spend 4 winters at sea are very rare in Scotland, although FRS have identified a few 4 SW salmon from the Esk during a 30 year period.

The markings on the scales consist of rings which are grouped together to form bands. The small bands at the centre of the scale are formed when juvenile fish are in the river, whilst the much wider bands surrounding these are formed during growth at sea (Figure 1a). During periods of slower body growth (winter) the growth of the scale is similarly reduced, thus growth rings appear closer together and give the impression of a dark band. In contrast, during periods of high growth rates (summer), there is more space between rings, giving the appearance of a light-coloured band. By counting the number of summer and winter bands, the age of the fish is determined (Figure 1b).



**Figure 1 (a).** A salmon captured at Inchmarlo in February, which spent two years in the river and three years at sea. The freshwater and marine growth phases are highlighted.

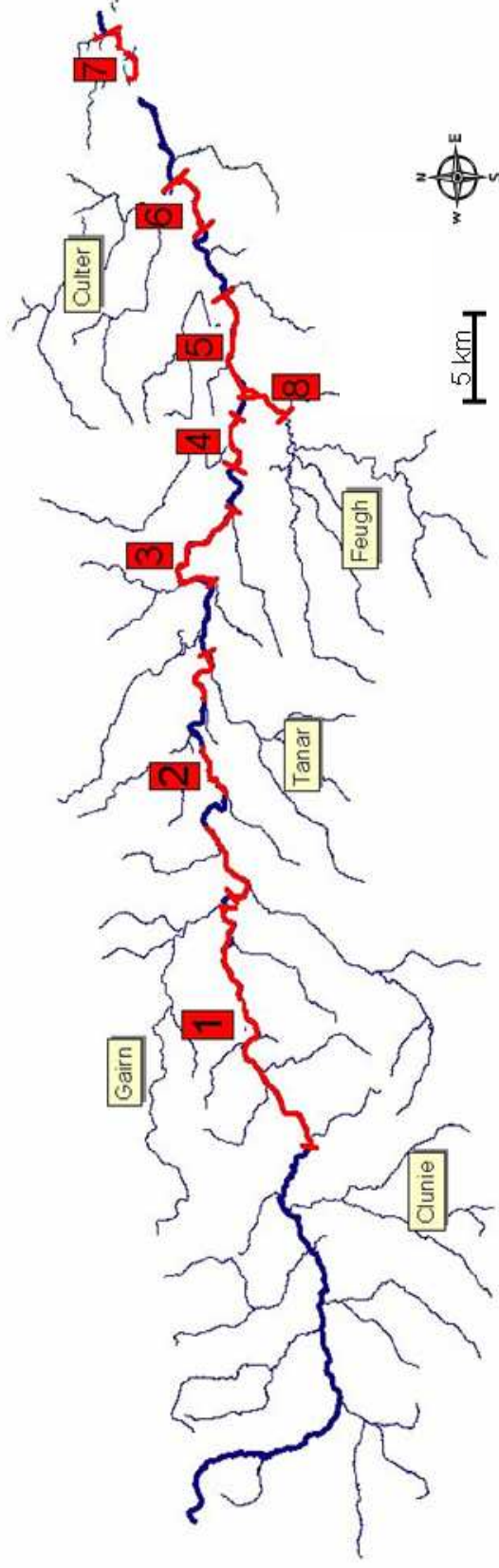


**Figure 1 (b).** The same salmon captured at Inchmarlo in February. The dark bands formed during freshwater winters (FW) and seawater winters (SW) are highlighted.

To ensure that this scale sampling programme would represent the whole Dee salmon population, the sampling strategy was designed to provide an unbiased sample. This was achieved by ghillies sampling fish strategically (every 2<sup>nd</sup> – every 6<sup>th</sup> fish landed, depending on the 5-yr average number of fish caught on the beat(s)). When the ghillies were not present to sample the fish, the following fish landed at which the ghillie was present was sampled instead. Above all, this avoided any ‘choice’ in which fish to sample. The participating beats are spread along the length of the Dee.

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).

## Sampling Locations



1. Upper Dee; above Gairn
2. Upper Dee; below Gairn
3. Middle Dee
4. Middle Dee; above Feugh
5. Lower Dee; below/surrounding Feugh
6. Lower Dee
7. Dee entrance
8. Feugh

**Figure 2.** Map of the scale sampling areas on the River Dee

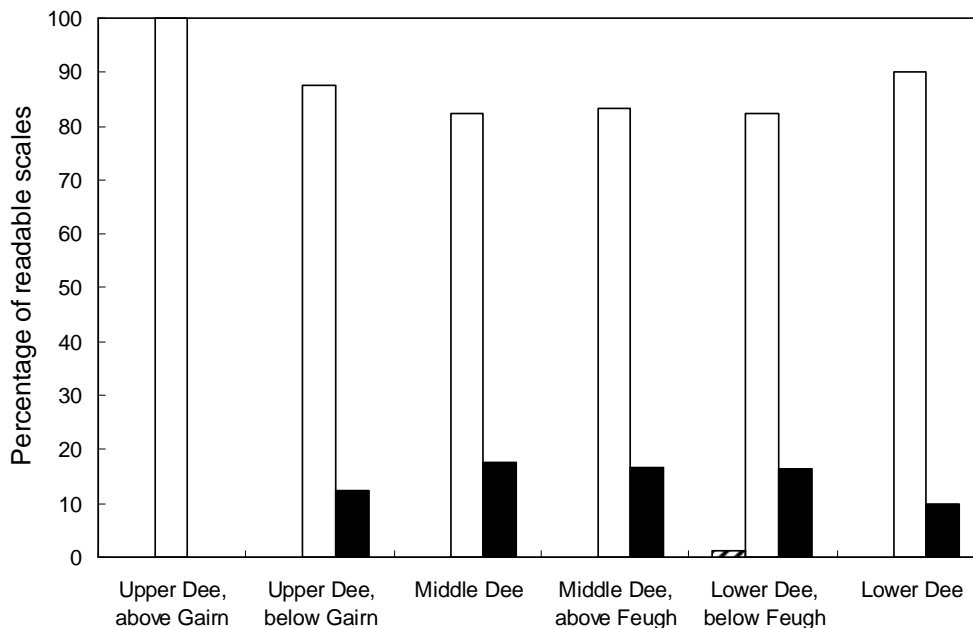
## SECTION 1

### Location

The scale sampling was carried out in 8 locations (Figure 2):

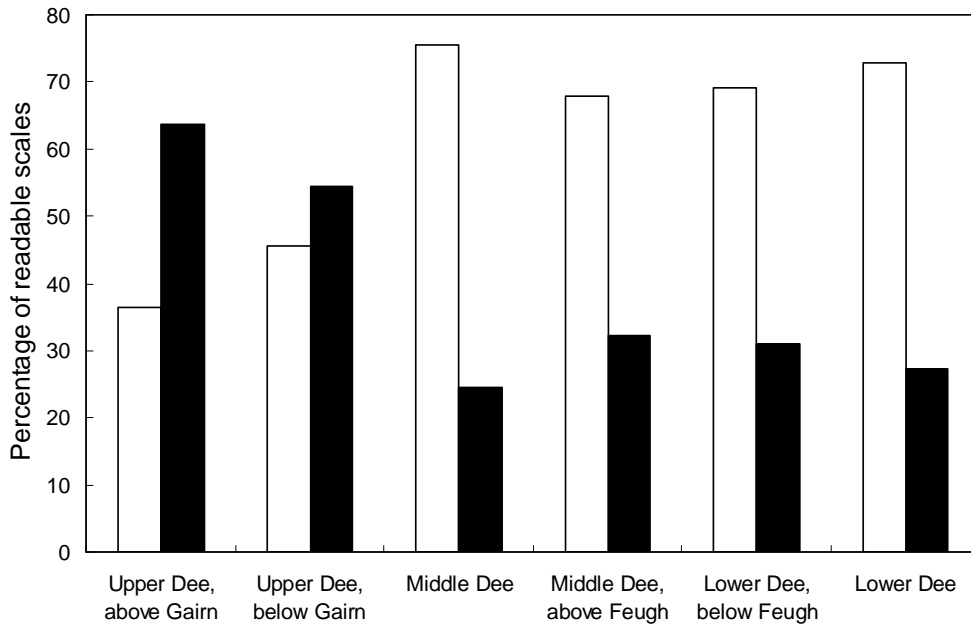
1. Upper Dee, above Gairn (Crathie, Lower Invercauld, Ballater Angling Association)
2. Upper Dee, below Gairn (Monaltrie, Ballater Angling Association, Deecastle, Aboyne Castle)
3. Middle Dee (Upper & Lower Dess, Kincardine & Borrowston, Ballogie & Carlogie)
4. Middle Dee above Feugh (Middle Blackhall,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

- The numbers of fish sampled at each location were: location 1 (25), 2 (24), 3 (54), 4 (30), 5 (83), 6 (11). Note that no scales have been collected this Spring from the Dee entrance (7) or the Feugh (8).
- A similar proportion of 2 SW (82-90%) and 3 SW (10-18%) salmon were caught at the different locations along the Dee, with the exception that all fish caught in the uppermost location were 2 SW (above the Gairn; Figure 3). However this may be influenced by most 3 SW fish being caught early-on in the season (especially February) and no fish were sampled at this upper location until April.



**Figure 3.** The percentage of salmon sampled at locations along the Dee that were grilse (▨), 2 SW salmon (□) and 3 SW salmon (■).

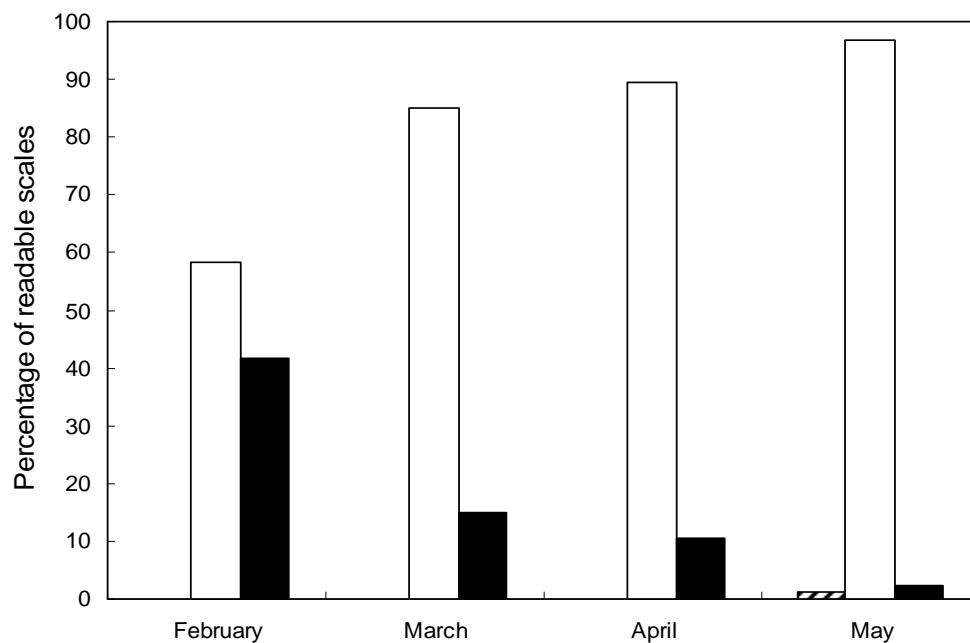
- All salmon had migrated to sea as smolts after either 2 or 3 years in the river. Significantly more salmon entered the sea as 3 year old smolts in the Upper Dee (59% of all smolts) compared to the Middle and Lower Dee (29% of smolts; Figure 4). The difference in age structure between the two Upper Dee locations (above and below Gairn) was not statistically different and neither was the variation in age structure between the four Middle/Lower Dee locations.



**Figure 4.** The percentage of juvenile salmon at each location that smolted after 2 (□) and 3 (■) years in the river.

## Month of entry

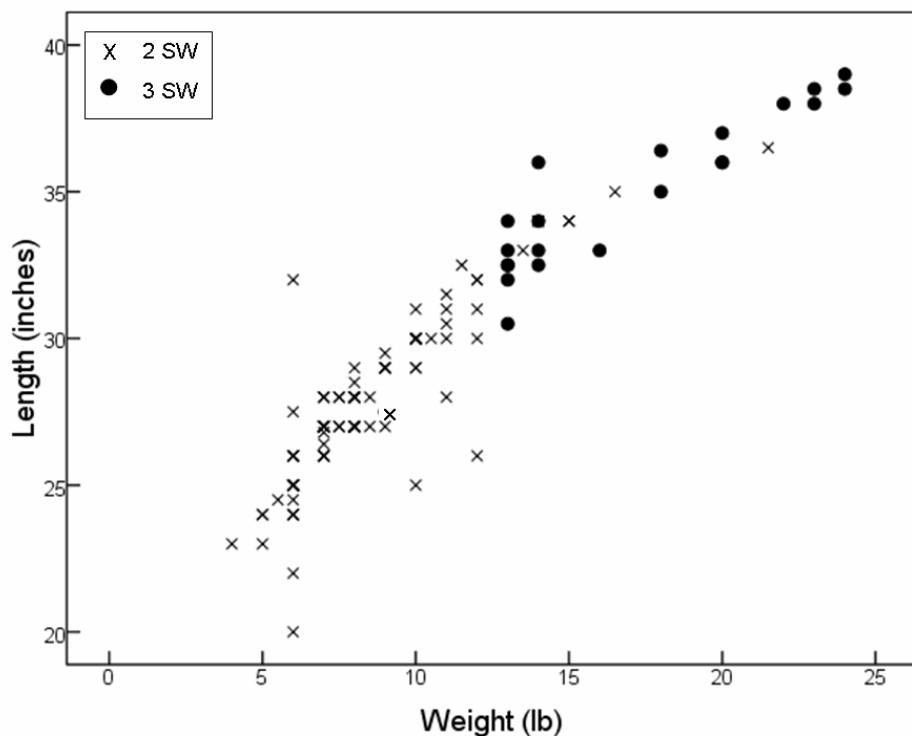
- The number of scales collected in each month were: Feb (41), Mar (27), Apr (68), May (91).
- The occurrence of 3 SW salmon was greatest in February (39% of all fish sampled in February), and the proportion of 3 SW fish declined in the following months (only 2% of fish sampled in May were 3 SW; Figure 5). A single grilse was sampled in this Spring period (Banchory, 19<sup>th</sup> May).
- The age at which the salmon migrated to sea as smolts was either 2 or 3 years (average of 61% and 39% of smolts, respectively) and did not significantly vary between fish captured in different months (as determined by statistical tests).



**Figure 5.** The percentage of sampled fish in each of the Spring months that were grilse (▨), 2 SW salmon (□) and 3 SW salmon (■).

## Fish Size

- The size (length and weight) of 3 SW salmon was significantly greater than 2 SW salmon, as determined by statistical tests. 3 SW salmon were 13 lb and 30" (75 cm) or greater.
- There was some overlap in sizes between the 2 and 3 SW groups, mainly due to a few large 2 SW individuals (Figure 6). The largest 2 SW salmon was 21.5 lb, although the majority were < 13lb.
- The size (length and weight) of the 2 SW and 3 SW fish sampled did not increase during the Spring months (confirmed with statistical tests). This is understandable given that only four salmon (out of 227; all four in late May) had grown since the winter period (as shown by presence of growth rings on the scales after the winter band). We would expect to see a significant increase in the size of fish within each age class throughout the remainder of the season once growth at sea resumes (e.g. average size of 2 SW fish will increase).



**Figure 6.** Length (inches) and weight (lb) of 2 SW (x) and 3 SW (•) salmon sampled in Spring 2008.

## Growth Checks

- ‘Checks’ are marks on the scale which indicate a period during the growth phases (Summer) where growth has declined/halted (caused by a reduction in scale deposition).
- More than half (53%) of the salmon sampled had scales that were checked.
- Moderate-severe checks in Summer 2007 affected 74 (33%) of salmon and in Summer 2006 affected 41 (18%) of salmon (note that some fish had checks in both summers).

## **Repeat Spawners**

- A total of eight salmon (4%) were repeat spawners. These fish had returned to the river previously and spawned, then survived (as a kelt) and returned to sea and resumed feeding, and have now entered the river again, in preparation to spawn for their second time in 2008.
- All eight repeat spawners had spawned once before (2006). Seven of these fish entered the river for the first time in Spring 2006 as 2 SW salmon. One of the fish entered in Spring 2006 as a 3 SW salmon.
- Five of the repeat spawners were caught in February (12.2% of all February fish), one was caught in April and two in May. They were caught on seven beats on the middle and lower Dee and were 11 - 23 lb/ 30-38.5".

## **Kelts**

- 60 of the 100 kelts were caught in February and 20 were caught in both March and April.
- Four kelts could not be aged due to scales being regenerated or erosion of scales being too severe. Of the remaining kelts, 57 (59%) were grilse and 39 (41%) were 2 SW salmon. There were no 3 SW salmon kelts.
- Ages of kelts at smolting time could not be determined for 13 fish due to regeneration of scales. Of the remainder, 65 (75%) of kelts had been 2 year old smolts and 22 (25%) had been 3 year old smolts.

## **Sea Trout**

- Scales were sampled from only three sea trout (all caught in May). All three fish had entered the sea last year as smolts and were thus 1 SW fish. Two sea trout had undergone significant growth since the end of Winter 2007.
- Five sea trout kelts were sampled in February/March. Two of these had spent 1 year at sea before re-entering the river last year and spawning for their first time. Two had spent only a few months at sea before re-entering the river to spawn initially in 2005, then returning to sea and spawning again in 2006 and 2007. 1 sea trout could not be aged as its scales were regenerated.

## **Brown Trout**

The three brown trout caught and sampled on the river were:

1. 2.25 lb; 9 years old and spawned four times
2. 2.5 lb; at least 6 years old and spawned twice
3. 3.75 lb; at least 8 years old and spawned four times

## 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)
- ✦ Colin Espie (Deecastle)
- ✦ 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)
- ✦ Mark Paterson (Upper & Lower Dess)
- ✦ Jim Paton (Upper Drum & Lower Durriss)
- ✦ Terry Paton (Little Blackhall & Inchmarlo)
- ✦ Walter Raitt (Banchory)
- ✦ Karl Revel (Invery)
- ✦ Brian Sim (Crathes)
- ✦ 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 for advice on setting up the scale sampling programme.

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