

## **Chapter 2**

### **Supplementary Fisheries Report for the Logiealmond Wind Farm Proposal**

**Report Produced by AMEC Earth and Environmental**

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## 2 SUPPLEMENTARY FISHERIES REPORT

### 2.1 Introduction

1 AMEC Earth and Environmental were commissioned to investigate the fisheries impacts on the burns draining the proposed Wind Farm site at Logiealmond. The purpose of the investigations was to determine if the local burns support salmonid populations, so that appropriate management practices can be put in place during the different phases of development to protect fish populations and habitat.

### 2.2 Background

2 The Environmental Statement for the proposed Logiealmond Wind Farm development was prepared in July 2007. An assessment of the current status of the fish populations in the surrounding area was determined by the following methods:

- Site visit and visual inspection of fish habitat
- Consultations with representatives of the Tay and District Salmon Fisheries Board (TDSFB)
- Review of existing historical fish population assessment data
- Review of historical angling catch statistics

3 A review of the historical fish population survey data at this time indicated that there were shortfalls in the dataset in relation to the site layout of the proposed development, particularly for the small tributaries draining the proposed development area.

4 After consultations with the TDSFB, it was decided that additional targeted fish sampling and habitat assessment was needed to provide further baseline data and these additional investigations are presented in this report.

#### *2.2.1 Site Overview*

5 The proposed development is sited on an upland area that separates the Strathbraan and Logiealmond Valleys. This area shows a radial drainage pattern with a number of tributaries draining northward to the River Braan that flows eastward to the north of the site and forms a confluence with the River Tay at Dunkeld. The main tributaries that drain the site and flow northward to the River Braan, from west to east across the site are:

- Girron Burn
- Dullator Burn
- Corrody Burn
- Allt an t-Seangain

6 The southern area of the site is drained by a number of watercourses of which the principal surface water drainage feature is the Shochie Burn which flows south and eastward, along the eastern boundary, to form a confluence with the Ordie Burn before discharging into the River Tay to the north-east of Luncarty. The Clachy Burn also drains the south-eastern corner of the application area and this burn forms a confluence with the Shochie Burn. The site boundary encompasses the headwaters of both Milton Burn and

Shelligan Burn that flow southward to form a confluence with the River Almond. The River Almond, located to the south of the application area flows eastwards to form a confluence with the River Tay to the north of Muirton.

- 7 The area through which these watercourses flow is a relatively unaltered upland area and is characterised with isolated areas of peat that extend from small areas of blanket bog and is managed for upland livestock grazing and game conservancy. A few small pockets of coniferous plantation are present with the proposed development area but these are generally located away from watercourses and are unlikely to have had any significant effect on their fish habitat quality or water quality status.
- 8 Further information on the site and fish habitat conditions on the main rivers Almond and Braan for example, can be found in the Environmental Statement, July 2007.

### **2.3 Assessment Methodology**

- 9 A quantitative fish survey by electrofishing and a fish habitat assessment was carried out at ten monitoring locations around the site.

#### *2.3.1 Electrofishing Methodology*

- 10 Quantitative sampling of the fish populations was undertaken at each of the nominated survey sites using a three-catch depletion method. At each sampling location, where the local terrain allowed, a minimum of a 30m section of river was surveyed. The downstream and upstream limits were enclosed by stop-nets; in places an in-situ barrier was used as the sampling limit. The enclosed sections of watercourse were each sampled on three occasions by wading in an upstream direction, between the stop-nets, using pulsed DC electric fishing equipment. The catch from each sampling run was held and then processed.
- 11 Processing of the catch involved:
  - Species identification of each captured fish
  - Fork length measurement of each fish to the nearest millimetre
  - Bulk weighing by species of each catch
- 12 Following processing all fish were returned to the watercourse. Where the catch was sufficient to allow further data interpretation, population structures and size estimates were made.

#### *2.3.2 Fish Habitat Assessment*

- 13 At each of the nominated sites, a habitat assessment was carried out by recording a range of information. A short discussion on the characteristics of each site is set out in the results section below; the characteristics recorded at each site included:
  - Channel width
  - Channel depth
  - River morphology

- Riverbed substrate composition
- Presence of in-stream cover
- Presence of riparian cover
- Riparian land use
- Degree of shading
- Presence of silts

## 2.4 Results

- 14 The results of the electrofishing and habitat assessment for each site, are discussed in brief below.

### 2.4.1 Dullator Burn (Site Code LOGIE 9)

- 15 Electrofishing and a fish habitat assessment were carried out on a 37 metre stretch of Dullator Burn.
- 16 The average wet width of the channel was found to be 3.36m. The depth varied; some stretches were shallow at less than 10cm deep, whilst deeper sections exceeded 50cm in depth. A great variety of flow types were identified, including pools and riffle areas.
- 17 The substrate was found to contain only a small proportion (approximately 5%) of gravels, with the rest of the substrate split approximately evenly between pebbles, cobbles and boulders. Instream fish cover appeared to be good but bankside cover was low with only a small proportion of the banks being undercut for example; over 80% of the banksides were found to be bare of vegetation.
- 18 The surrounding land use could be described as semi-managed upland moor with areas of blanket bog, rough grasses and heather. Overall, surveyors noted the river habitat to be relatively poor with regards to salmonid spawning potential; yet it offered good habitat for migratory salmonid parr and brown trout.
- 19 No Salmon were found during the assessment; however, a total number of 18 trout were caught over the three electrofishing catches (13, 4 and 1 caught on each successive catch). Given the density of different fish sizes caught, an approximation of four 0+ age class, seven 1+ age class and seven 2+ age class trout were estimated. A 'Zippin' estimation of 14.8 trout per 100 square metres was calculated. Under the Environment Agency National Fisheries Classification Scheme (NFCS), this stretch scores as a 'Class D' for abundance of 0+ age class trout and a C for >0+ age class trout.



**Photograph 1: Photograph showing the assessment length of Dullator Burn (assessment made between the two large boulders visible in the photograph).**

#### *2.4.2 Tributary of Dullator Burn (Site Code LOGIE 4)*

- 20 Electrofishing and a fish habitat assessment was carried out on a 49 metre stretch downstream of the ford on this unnamed tributary of the Dullator Burn.
- 21 The average wet width was measured at 1.2m and the depth was found to be entirely below 20cm (60% less than 10cm deep). The bed substrate was dominated by pebbles and cobbles, with approximately 10% being classified as gravels.
- 22 The flow was best characterised as a shallow glide, but other parts of the stretch varied in their flow characteristics. The instream cover was found to be good and 100% of the bankside offered cover to fish via undercut banks and draped vegetation.
- 23 No fish were caught within this stretch during the electrofishing. Due to the fact that no fish were found, a ten metre stretch upstream of the weir was also fished, but no fish were found to be present here either. There was no photographic record taken at this site.

#### *2.4.3 Allt an-t-Socalch (Site Code LOGIE 3)*

- 24 A 34m stretch of Allt an-t-Socalch was fished and surveyed. The burn was found to be relatively narrow (average bed width of 2.18m) and it had cut down through the upper soil layers so that it exhibits narrow steep sides, and is wet across its entire width. Upland, rough grasses dominate the

surrounding landuse; a pocket of coniferous plantation can be seen in the photograph below, but this is set back from the stream and is not thought to have a large effect upon the stream chemistry.

- 25 The stream showed mixed depths below 40cm; 50% of the depths were measured between 11 and 20cm depth. The substrate was found to be a mixture of gravels (~10%), pebbles (~35%), cobbles (~30%) and boulders (~25%); this mix of substrate types, particularly the larger boulders results in an excellent degree of instream fish cover. The bankside cover for fish is also good (approximately 75% of the entire length), due to undercut banks and draped vegetation.
- 26 The flow characteristics were mixed along the reach, ranging from still, smooth marginal areas up to small lengths of riffle.
- 27 There were no salmon caught, however, a total number of 28 trout were caught over the three electrofishing catches (24, 3 and 1 caught on each successive catch). Given the density of different fish sizes caught, an approximation of seven 0+ age class, ten 1+ age class and eleven 2+ age class trout were estimated. A 'Zippin' population of 37.9 trout per 100 square metres was estimated. Under the Environment Agency NFCS, these numbers equate to a 'Class C' for abundance of 0+ age class trout and a 'Class A' (highest score) for >0+ age class trout.



**Photograph 2: Photograph showing the Allt an-t-Socalch. Note the surrounding landuse and the narrow stream channel.**

#### *2.4.4 Dullator Burn (Site Code LOGIE 1)*

- 28 The Dullator Burn was surveyed from the confluence with the River Braan upstream for a length of 27m. The channel is shallow, wide and fast flowing. The wet width of the channel was found to be 4.45m and the total bed width was 5.76m. The depth of the channel was measured at less than 30cm at all points and the flow although varied along the length was best characterised as a shallow glide.
- 29 The streambed substrate ranged from the size of gravels (approximately 5% cover) up to the size of boulders. The instream fish cover was good; however, the banksides were bare and no bankside fish cover was offered as a result. Approximately 40% canopy cover was recorded.
- 30 Salmon, Trout, Minnows (three in number) and Stoneloaches (four in number) were caught during the electrofishing. A total Zippin population estimate of 13.34 salmon per 100 square metres was calculated from the numbers and relative density of fish. A total Zippin estimate of 17.0 trout per 100 square metres was also calculated. Under the Environment Agency NFCS, used in order to give an interpretation of population density, these numbers equate to a 'Class D' for abundance of 0+ age class salmon; a 'Class C' for abundance of 0+ age class trout and a 'Class D' for >0+ age class trout; no older salmon were present.
- 31 The fact that Dullator Burn is upstream of the impassable Falls of Braan, combined with no catches of older Salmon suggests that the Salmon caught during electrofishing are examples of fish artificially stocked into the River Braan; the Braan is regularly stocked with reconditioned kelts for example. We were informed that Salmon redds were stocked out in May 2007 by the Tay District Salmon Fisheries Board.



**Photograph 3: View downstream on Dullator Burn towards the confluence with the River Braan.**

#### *2.4.5 Corrody Burn (Site Code LOGIE 2)*

- 32 The Corrody Burn flows northwards to the River Braan at Little Findowie. A 37 metre stretch of the Corrody Burn was assessed; at this point the burn flows down a shallow valley covered in coarse grasses, rush and heather.
- 33 The Burn was found to have an average bed width of 2.5m and a wet width of 2.18m. The depth of the burn was varied over this short stretch; depths of less than 10cm, up to depths greater than 50cm were recorded.
- 34 Substrate type was mixed; gravels, pebbles, cobbles and boulders were all recorded in the stream bed. The presence of boulders and the mix of substrate types results in good instream fish cover. The bankside cover is high (cover along almost the entire length) due to the banks being undercut and also draped with vegetation.
- 35 The flow at the time of the visit, was best characterised as a shallow glide, but again variability of flow was found along the length.
- 36 Electrofishing found no salmon to be present in the Corrody Burn, but did result in a catch of 74 trout, 1 eel and 1 group of lamprey larvae. Given the density of different trout sizes caught, an approximation of twenty 0+ age class, thirty one 1+ age class and twenty three 2+ age class trout were estimated. A total 'Zippin' population of 93.4 trout per 100 square metres was estimated. Under the Environment Agency NFCS, these numbers equate to a 'Class B' for abundance of 0+ age class trout and a 'Class A' for >0+ age class trout.



**Photograph 4: View upstream on Corrody Burn (LOGIE 2 site)**

#### *2.4.6 Milton Burn (Site Code LOGIE 5)*

- 37 The Milton Burn flows south towards its confluence with the River Almond near Glenalmond College. A 29 metre stretch of the Burn was assessed and electrofished downstream of a ford. Surrounding landuse is exposed, rough moorland grazing with slopes of bracken, heather and some exposed rock outcrops.
- 38 The average stream bed width was found to be 4.9m and the average wet width was 4.7m. The depth of the burn was variable; all points on this stretch were found to be below 50cm in depth, with 20% of the water less than 10cm deep. The burn was noted to be considerably deeper above the ford; however this is likely to be artificial given the impounding effect of the boulders strengthening the crossing point.
- 39 The substrate was found to be a mixture of gravels (10%), pebbles (40%), cobbles (30%) and boulders (20%). There was no instream vegetation present, but good instream cover was provided by the mix of substrate types. Flow at this point was variable in nature due to the character of the stream that displayed typical pool and riffle sequencing. An average of 90% of the banksides were bare, therefore offering little bankside cover for fish; there was just 20% of the left bank found to be undercut. No overhanging boughs or canopy cover are present on this stretch.
- 40 There were no Salmon found during the electrofishing, but 61 trout were caught. Given the density of different trout sizes found, an approximation of forty 0+ age class, twelve 1+ age class and nine 2+ age class trout were

estimated. A total 'Zippin' population of 47.1 trout per 100 square metres was estimated. Under the Environment Agency NFCS, these numbers equate to a 'Class B' for abundance of 0+ age class trout and a 'Class B' for abundance of >0+ age class trout.



**Photograph 5: View upstream on Milton Burn (Site Code Logie 5)**

#### *2.4.7 Crachy Burn (Site Code LOGIE 6)*

- 41 Crachy Burn drains the South Eastern corner of the study site; tributaries of Crachy Burn drain southwards and the Burn itself flows roughly eastwards before joining the Shochie Burn. A 34 metre stretch of Crachy Burn was assessed and electrofished to the South-East of Crochan Hill. A large waterfall is present at grid reference NN96924 32832 (just downstream of a road crossing); the stretch below this waterfall was assessed.
- 42 The average bed width was found to be 3.1m wide and of this width, an average 2.3m was wet at the time of assessment. The water depth was variable along the length, but was below 40cm at all points. The flow characteristics along this stretch were varied; the stretch contains pools, shallow glides, runs and riffles.
- 43 The bed substrate is a mixture of pebbles, cobbles and boulders, with a small amount (5%) of gravels. The instream cover available for fish is good given the variety of substrate. Ninety percent of each bank is bare, with the other 10% undercut; therefore little bankside cover is offered to fish. No canopy cover or overhanging tree boughs are present at this site.
- 44 The nature of the burn made it difficult to sample much of the lower stretch because there were several small waterfalls and a high bed gradient. No

salmon were found, however a total of 32 trout were caught. Given the density of the different trout sizes found, an approximation of sixteen 0+ age class, five 1+ age class and eleven 2+ age class trout were estimated. A total 'Zippin' population of 39.8 trout per 100 square metres was estimated. Under the Environment Agency NFCS, these numbers equate to a 'Class B' for abundance of 0+ age class trout and a 'Class B' for abundance of >0+ age class trout.

- 45 For comparison purposes, the burn was also fished upstream of the road for 37 metres i.e. upstream of the large waterfall; no fish were caught upstream of the waterfall.



**Photograph 6: View upstream on Crachy Burn (Site Code Logie 6)**



**Photograph 7: Photograph showing the waterfalls upstream of the main electrofishing site on Crachy Burn (Site Code Logie 6).**

#### *2.4.8 Shochie Burn (Site Code LOGIE 8)*

- 46 Shochie Burn drains much of the East and Southeast of the study site. Small tributary streams such as Auchmore Burn, flow eastwards down the steep slopes into Glen Shee. The Shochie Burn flows through Glen Shee approximately south-eastwards on its way to the River Tay. The 32 metre long LOGIE 8 assessment site is located towards the head of Glen Shee at Auchmore in the relatively flat bottom area between the steep valley walls.
- 47 The average bed width of this section was recorded at 3.4 metres and the wet width was found to be 3.2 metres. The water depth along this whole length was less than 40cm. There was a mixture of flow characteristics along the length of the sample site. The lower half of the site could be characterised as a glide and the upper half of the section as riffle with shallow glide sections. Sections of deep glide both upstream and downstream of the site were also sampled.
- 48 The substrate was found to be a mixture of gravels, pebbles, cobbles and boulders; it was also noted that mosses were growing on the substrate, but these appeared to be stable. Cover available for fish within the channel was good. The average percentage cover offered by both banksides, through

undercut bankings and also some vegetation rooted in the riparian zone was found to be 55%.

- 49 There were no Salmon found during the electrofishing, but 61 trout were caught. Given the density of different trout sizes found, an approximation of forty one 0+ age class, fourteen 1+ age class and six 2+ age class trout were estimated. A total 'Zippin' population of 60.8 trout per 100 square metres was estimated. Under the Environment Agency NFCS, these numbers equate to a 'Class A' for abundance of 0+ age class trout and a 'Class B' for abundance of >0+ age class trout.



**Photograph 8: View upstream on Shochie Burn (Site Code LOGIE 8)**

#### *2.4.9 Shochie Burn (Site Code LOGIE 7)*

- 50 Site Code LOGIE 7 was located on Shochie Burn downstream of Glen Shee and just upstream of a ford. A 27metre long site was assessed on the right hand side channel of a mature island within the burn. The surrounding landuse is primarily rough pasture and bracken covered slopes; a small pocket of coniferous plantation on the slopes above the left bank can be seen in the photograph below.
- 51 The bed was found to have an average width of 6.4 metres; of this, an average wet width of 6 metres was recorded. The water depth was less than 40cm at all points, but varied along the length of this stretch. The bed substrate was found to be a mixture of gravel, pebbles, cobbles and boulders and this mix provides excellent instream cover for fish.
- 52 The flow along this stretch may best be characterised as riffles and shallow glides; however, there are also still marginal and shallow pools in places. The

large proportion of bare banking means that bankside cover for fish is relatively low. 60% of the left banking shows overhanging boughs.

- 53 Considerable Salmon, Trout and one eel were found during the electrofishing assessment. In total, 177 salmon were caught. Given the density of different sizes of Salmon, an approximation of One hundred and seventeen 0+ age class, fifty nine 1+ age class and one 2+ age class Salmon were estimated. A total 'Zippin' population of 122.3 Salmon per 100 square metres was estimated.
- 54 For comparison purposes, under the Environment Agency NFCS, these numbers equate to a 'Class B' for abundance of 0+ age class Salmon; a 'Class A' for >0+ age class Salmon; a 'Class B' for abundance of 0+ age class trout and a 'Class C' for abundance of >0+ age class trout.



**Photograph 9: View of Shochie Burn looking upstream (Site code LOGIE7)**

#### *2.4.10 Shochie Burn (Site Code SHO 2)*

- 55 The most downstream assessment of Shochie Burn was made at grid reference 29990,73380 (Site Code SHO2). A 24 metre stretch, upstream of Shenval and approximately 1km downstream of Site LOGIE 7 was assessed with regards to its fisheries habitat and also electrofished.
- 56 The average bed width of the channel throughout this stretch was found to be 6.4 metres and the mean wet width was 5.4 metres over the same length. The depth was very variable, ranging from values of less than 10cm up to between 41-50 cm in depth. The instream substrate was found to be a mixture of mostly cobbles, with some gravels, pebbles and boulders also.

- The mix of substrates contributes to excellent instream cover availability for fish.
- 57 Flow was found to be variable along the length of the site; most of the site is characterised as a shallow glide, but the mix of substrate and depth results in pooled areas, riffles and also 5% of the flow recorded as a noisy, turbulent, riffle.
- 58 Bankside cover for fish is very low (only 5% of the left bank) because the banks are relatively bare of vegetation. 80% of the left bank has overhanging boughs.
- 59 During the electrofishing, Salmon, Trout, one Eel (approximately 40cm in length) and three Stoneloach were caught. A total number of 178 Salmon were caught (126, 37 and 15 caught on each successive catch). Given the density of different fish sizes found, an approximation of one hundred and twenty two 0+ age class and fifty six 1+ age class Salmon were estimated. A 'Zippin' estimation of 143.0 Salmon per 100 square metres was calculated. Under the Environment Agency NFCS, this stretch scores as a 'Class A' for abundance of 0+ age class Salmon and a 'Class A' for >0+ age class Salmon. A 'Zippin' estimation of 143.0 Salmon per 100 square metres was calculated.
- 60 Twenty-nine trout were caught over the three electrofishing catches (20, 6 and 3 caught on each successive catch). Given the density of different fish sizes caught an approximation of twenty four 0+ and five 1+ trout were estimated. A 'Zippin' estimation of 23.6 trout per 100 square metres was calculated. Under the Environment Agency NFCS, this stretch of the Shochie Burn scores as a 'Class B' for abundance of 0+ age class trout and a 'Class D' for abundance of >0+ age class trout. A 'Zippin' analysis estimated 23.6 Trout per 100 square metres in this part of the Shochie Burn.



**Photograph 10: View of Shockie Burn looking upstream at Site code SHO2.**

2.4.11 Summary of Results

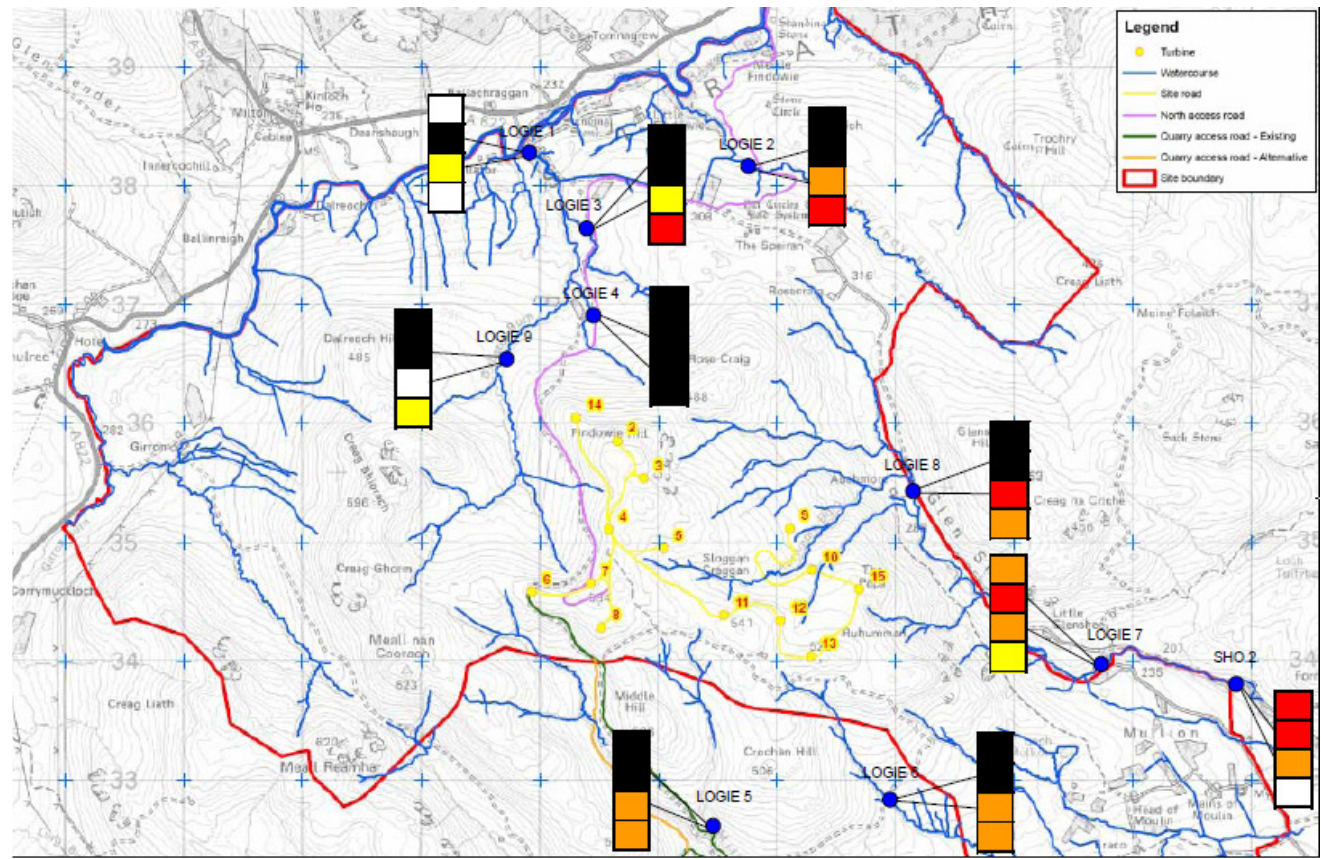
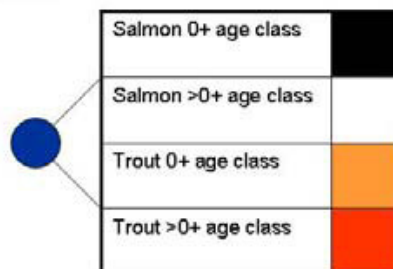


Figure 1: Electrofishing sites and NFCS results for each sample site; key to the NFCS classes is found below

(The Background map drawing cut from AMEC Wind Drawing No. 6128-640-PA-001 'Watercourses & Preliminary Site Infrastructure' (dated 10/07/06); therefore, please note that turbine layouts, access and site roads shown on this figure are indicative only and may have been subject to change since this map was produced.)

At each sampling location



Key

Class A Excellent	Class B	Class C	Class D	Class E	Class F Absent
Red	Orange	Yellow	White	Grey	Black

Classes based on abundance according to National Fisheries Classification Scheme

- 61 In Scotland there is no universally adopted scheme for classification of rivers in accordance with juvenile salmonid abundance. For comparison the juvenile fish survey method adopted in England and Wales is adapted for the National Fisheries Classification Scheme (NFCS) (NRA 1994a) which has therefore been used to provide a benchmark. This grades sampling sites according to juvenile salmon and trout abundance. This scheme allows rapid assessment of juvenile habitat quality within a river catchment and recognises six classes of abundance for each species and age group. The classes range from A – F with A being the highest (excellent) grade and F being the lowest indicating an absence of fish. The scheme is summarised in Table 10.1:

**Table 1: National Fisheries classification scheme for juvenile salmonid abundance (NRA 1994)**

Grade	Density of fish per 100 m <sup>2</sup>			
	0+ age class Salmon (fry)	>0+ age class Salmon (parr)	0+ age class Trout (fry)	>0+ age class Trout (parr)
A	>86	>= 19	>=38	>21
B	45 - 85.9	10 – 18.9	17 – 37.9	12 – 20.9
C	23 – 44.	9.5 – 9.9	8 – 16.9	5 – 11.9
D	9 – 22.9	3 – 4.9	3 – 7.9	2 – 4.9
E	<9	<3	< 3	< 2
F	None present	None present	None present	None present

- 62 The use of this classification system for Scottish rivers is not always considered wholly applicable as often sampling sites would show densities of both juvenile trout and salmon that significantly exceed the Grade A

threshold. In addition some sites may only support a naturally low abundance due to physical constraints of the fish habitat. However, the application of this system is still useful as it provides a good method of examining data on a catchment basis and also provides a useful tool for displaying data to the non-technical reader.

**Table 2: Classification of fisheries sites against the NFCS scheme**

	Salmon		Trout		Other species
	0+ age class	>0+ age class	0+ age class	>0+ age class	
<b>Dullator Burn (LOGIE 1)</b>	13.3 (D)	0 (F)	12.7 (C)	4.3 (D)	3 Minnows & 4 Stoneloach
<b>Corrody Burn (LOGIE 2)</b>	0 (F)	0 (F)	26.4 (B)	67.6 (A)	1 eel & lamprey larvae
<b>Allt an-t Socalch (LOGIE 3)</b>	0 (F)	0 (F)	9.5 (C)	28.5 (A)	none
<b>Dollater tributary (LOGIE 4)</b>	0 (F)	0 (F)	0 (F)	0 (F)	none
<b>Milton Burn (LOGIE 5)</b>	0 (F)	0 (F)	31.8 (B)	15.5 (B)	none
<b>Cranchy Burn (LOGIE 6)</b>	0 (F)	0 (F)	20.5 (B)	19.3 (B)	none
<b>Shockie Burn (LOGIE 7)</b>	82.3 (B)	40.4 (A)	19.6 (B)	8.1 (C)	1 eel
<b>Shockie Burn (LOGIE 8)</b>	0 (F)	0 (F)	41.4 (A)	19.7 (B)	none
<b>Dullator Burn (LOGIE 9)</b>	0 (F)	0 (F)	4 (D)	11.9 (C)	none
<b>Shockie Burn (SHO 2)</b>	98.7 (A)	44.4 (A)	19.5 (B)	4.0 (D)	1 eel and 3 stoneloach

Table Notes: 1) Densities expressed as number of fish / 100 m<sup>2</sup>, and 2) Density estimates derived where possible from Zippin population estimates

## 2.5 Discussion

- 63 The only system found to support natural populations of Salmon was the Shockie Burn (sites LOGIE 7 and SHO 2), which scored very highly on the NFCS for both 0+ and >0+ age groups in its lower reaches and which exhibited very good habitat for migratory salmonids. However, the survey at site LOGIE 8, the most upstream survey site on the Shockie Burn, did not find any salmon present; the reason for this is suspected to be the impassable falls at Little Glenshee which effectively act as an upstream limit for migratory salmonids.
- 64 Salmon of age class 0+ were also found in Dullator Burn (Site LOGIE 1), close to its confluence with the River Braan. However, these Salmon are suspected to be examples of fish artificially stocked into the River Braan (given the fact that this site is upstream of the impassable Falls of Braan and also no older Salmon were caught). We were informed that Salmon redds were stocked out in May 2007 by the Tay District Salmon Fisheries Board. The good habitat availability for young Salmon makes this an appropriate environment for artificial stocking.
- 65 The numbers of trout found across the Logiealmond river system reflect the availability of high quality fish habitat. Varied flow types and depths, gravel

substrate areas and bankside cover in places all contribute to good habitat availability on the burns draining the proposed Logiealmond site. A tributary of Dullator Burn (LOGIE 4) was the only watercourse where no trout were found to be present; this is a narrow and shallow tributary towards the headwaters of Dullator Burn. Of particular note are those high density populations above impassable barriers to fish migration; it is possible that these trout populations are isolated and thus have limited exchange of genetic material. These small populations of trout may hold important genetic reserves and their continued protection should be ensured.

- 66 The results of the habitat surveys and electrofishing catches indicate that all middle and lower reaches of the burns draining the proposed wind farm scheme site offer potentially good spawning habitat. The upstream limit for migratory salmonids is limited by the obstacles to fish migration on the Shochie Burn and the Braan system; however, the artificially stocked 0+ age class Salmon that were found on the Dullator Burn confirm that the Braan habitat is of suitable quality to act as a migratory Salmonid nursery habitat. The upstream penetration by adult Salmon on the Crachy and Milton Burns is likely to be limited by slope, narrow channel width and natural barriers (such as the possible waterfall migration barrier identified at site LOGIE 6) and the headwaters of these burns that lie within the proposed site boundary may be too narrow for example, to support fish. Similarly, we would expect the density of trout to decline towards the headwaters; Sampling sites LOGIE 5 and LOGIE 6 for example, are downstream of the proposed wind farm site area and will exhibit a higher density of trout than their headwater streams. However, we should retain the assumption that all watercourses including headwater tributaries may contain trout and habitat suitable for spawning; the presence of 0+ age class fish is indicative of upstream spawning habitat.
- 67 The lower and middle reaches of the burns draining the proposed Logiealmond site have the potential to also provide spawning habitat for sea trout, which will often enter small watercourses to spawn. The upstream limit for sea trout migration is limited by the same obstacles that limit Salmon migration. As trout and sea trout cannot be differentiated at a young age, it should be assumed that sea trout are present throughout the burns draining the proposed wind farm site (where obstacles do not restrict upstream movement).
- 68 Lamprey have been recorded during the electrofishing surveys of the Corrody Burn and for the purpose of this scheme should be assumed to be widely distributed throughout the burns that drain the proposed wind farm site. As listed in the Environmental Statement, the Brook Lamprey is offered much protection by a range of legislation, and management practices should be set in place to minimise any potential impacts upon fish habitat conditions and water quality.
- 69 The findings of these additional fisheries investigations support the anticipated distributions of fish that were discussed in the Environmental Statement (July 2007). The predicted impacts arising from all phases (construction, operation and decommissioning) of the proposed development scheme, and the associated mitigation measures set out in the Environmental Statement (July 2007) are found to be appropriate; and our confidence in these measures is increased, given our further knowledge of the fisheries system.