Moneypool Burn Habitat And Electrofishing Survey 2007

1 Introduction

Following concerns regarding declining sea trout catches on the Moneypool Burn (tributary of the River Cree), Galloway Fisheries Trust (GFT) were requested by the Wild Trout Trust (WTT) to examine the watercourse and advice on the health of sea trout stocks and suggest possible enhancement work if necessary. Data was collected by GFT staff by undertaking a habitat and electrofishing survey of the burn.

During the summer of 2007, GFT undertook a habitat survey of the Moneypool Burn. The habitat survey was aimed at identifying any factors which may potentially limit juvenile trout production in the catchment.

An electrofishing survey was used to identify the abundance and distribution of juvenile salmon and trout populations. Four sites were selected to give a full representation of the different catchment habitats.

2 AIMS OF THIS REPORT

The aims of the habitat and electrofishing surveys were:

- To assess the state of habitat in the catchment with regards to salmonid spawning.
- To identify areas of the catchment where the habitat may be limiting juvenile salmonid production.
- To identify areas of the catchment where the habitat could be enhanced to improve juvenile productions.
- To monitor the distribution and abundance of juvenile salmonids at specified sites within the Moneypool Burn catchment.

3 METHODS

3.1 SFCC Habitat Survey

The Scottish Fisheries Co-ordination Centre (SFCC) developed a habitat survey method that addresses the needs of fisheries managers and researchers. It was specially developed to assess habitat for juvenile salmon and trout and not used to evaluate habitat for other fish species.

The survey methodology takes into account many recording requirements and information gathered about river stretches using SFCC fish habitat survey protocol can be used by trained interpreters and within reason to:

- Evaluate quality of habitat for juvenile salmonids
- Identify the potential location of salmonid spawning gravels
- Identify stream stretches that would be of benefit from habitat improvements
- Target areas for stocking
- Identify and classify point pollution sources
- Identify and grade obstacles to fish migration
- Identify location and type of past channel/bank modifications

Juvenile salmonids have specific habitat requirements. For example, water quality, shelter and feeding territory, availability of food and availability of spawning. Tables 1 and 2 describe some basic habitats for different life stages of salmon and trout. The precise habitat requirements for each species and life stage is extremely complex.

Table 1: Age class habitat requirements of salmonids

Life stage	Salmon	Trout
Eggs/alevins	Golf ball to tennis ball sized substrate.	Dependent on fish size: Golf ball to tennis ball sized substrate for large brown trout and sea trout, pea to golf ball sized material for smaller trout.
Fry	Golf ball to tennis ball sized substrate, fast flowing, shallow broken water.	Golf ball to tennis ball sized substrate, slow to medium flowing shallow water, often concentrated at stream margins.
Parr	Tennis ball to football sized substrate, fast flowing broken water, often slightly deeper than fry.	Variety of substrate, undercut banks, tree roots, big rocks, deeper slower water.
Smolts	Unknown.	Unknown.
Adults	Deep pools.	Deeper areas, sustained flow but not too fast, undercut banks, tree roots, good instream vegetation and large rocks.

3.1.1 Data recording

During the habitat SFCC survey, data is collected on the following to obtain a full review of the suitability of fish habitat along a river system:

- Water depth
- Water flow type
- Instream characteristics
- Bankside characteristics
- Riparian vegetation
- Surrounding land use

Information may also be collected on potential causes of unsuitable habitat, particularly with a view to taking action against further degradation. Characteristics are collected such as:

- Bankside fencing and grazing
- Bankside erosion and collapse
- Pollution sources
- Bankside and channel modifications

3.1.2 Method

A detailed survey plan is drawn up before commencing a habitat survey and the information to be collected identified.

When out in the field, the river is divided up into stretches using intersections marked on an Ordnance Survey map (1:50000 or 1:25000). SFCC methodology recommends the use of short survey stretches which should be:

- No more than 100m long for rivers of 0m to 4m wide
- No more than 250m long for rivers of >4m to 10m wide
- No more than 500m long for rivers of >10m wide

3.1.3 Water depths

The survey stretch wetted area is recorded as percentage depths in four categories:

- 0-20cm
- 21-40cm
- 41-80cm
- > 80cm

3.1.4 Substrates

In each survey stretch the percentages of each substrate type is recorded. Substrate is always recorded from the point of view of fish cover.

- High organic - Very fine organic matter
- Silt - Fine, sticky, mostly inorganic material
- Sand - Fine, inorganic particles, <=2mm diameter
- Gravel - Inorganic particles 2-16mm diameter
- Pebble - Inorganic particles 16-64mm diameter
- Cobble - Inorganic particles 64-256mm diameter
- Boulder - Inorganic particles > 256mm diameter
- Bedrock - Continuous rock surface
- Obscured - Something obscuring substrates that cannot physically be moved

3.1.5 Flows

Flow percentages of the survey stretch wetted are recorded.

Table 2: Flow types

Flow type	**Description**
Still marginal	< 10cm deep, still or eddying
Deep pool	>=30cm deep, water slow flowing, smooth surface appearance
Shallow pool	< 30cm deep, water slow flowing, smooth surface appearance
Deep glide	>=30cm deep, water flow moderate/fast smooth surface appearance
Shallow glide	< 30cm deep, water flow moderate/fast, smooth surface appearance
Run	Water flow fast, unbroken standing waves at surface, water flow silent
Riffle	Water flow fast, broken standing waves at surface, water flow audible
Torrent	White water, chaotic and turbulent flow, noisy and difficult to distinguish substrates

3.2 SFCC Electrofishing Survey

3.2.1 Data recording

The GFT is a partner in the Scottish Fisheries Co-ordination Centre (SFCC), an initiative involving the Scottish Fishery Trusts and others, including the Scottish Executive Freshwater Fisheries Laboratory, the Tweed Foundation, the Spey Research Trust, the Tay Foundation and the River Conon District Salmon Fishery Board.

This group has, in partnership, developed a set of agreed methodologies and record sheets for use with electrofishing surveys and an associated database in which to record information gathered from such surveys. The electrofishing and habitat surveys undertaken by the GFT have been completed to the standards, which are required by the partners of the SFCC and recorded using the formats agreed by this group.

It is the policy of the GFT to disinfect all relevant equipment both prior to and following work in each catchment, to ensure that there is no transfer of disease organisms.

3.2.2 Techniques

To assess the fish populations present within a section of river, fish within the site were stunned and removed from the water using electrofishing equipment. They were then lightly anaesthetised using a specific fish anaesthetic (Benzocaine solution – Ethyl 4 – Aminobenzoate) dissolved in Metholated Spirits, identified, measured and once removed, returned unharmed to the area from which they were captured. The electrofishing team works across a section of river and upstream, thereby fishing the entire river in the surveyed area. A team of three trained personnel undertook electrofishing at all survey sites. The sites were electrofished once, thereby enabling minimum estimates of fish numbers to be calculated.

3.2.3 Equipment used

Electrofishing was preformed using a mobile Electracatch backpack (WFC 911) equipment.

This equipment is powered by a battery which can provide up to 400 volts of direct current with a variable voltage output (280-300 volts). A smooth direct current was used at all sites. A cathode of braided copper (placed instream) is connected to the backpack and a mobile single anode, consisting of a pole-mounted stainless steel ring and trigger switch.

3.2.4 Site measurement

Site dimensions were recorded at each site. A site length was noted, with wet and dry widths recorded at five points in the surveyed section. An average wet and dry width was then calculated, with the wet width utilised on the calculation of fish population densities at each site.

3.2.5 Instream / Bankside cover

Water flow characteristics, depths and the type and quality of instream and bankside cover that was available to fish, was assessed at each site and recorded in a format agreed by the SFCC. The riparian zone was also characterised by recording the predominant vegetation structure on bank face and bank top. ‘Bare’ refers to predominantly bare ground; ‘uniform’ refers to predominantly one vegetation type but lacking scrub or trees; ‘simple’ refers to two/three

vegetation types (with or without scrub or trees) and ‘complex’ refers to four or more types which must include scrub or trees.

4 Habitat Survey

4.1 Overview

The Moneypool Burn rises in the hills of Cairnsmore of Fleet, before flowing approximately 10km to join the Cree estuary (at Wigtown Bay) a short distance downstream of Creetown. There are a number of small tributaries which join the Moneypool Burn, the largest being the Culcronchie Burn, which flows into the main stem a short distance downstream of Falbae Farm.

There is a range of land uses present in the catchment. The upper reaches tend to be dominated by rough pasture and coniferous woodland. The middle and lower reaches support extensive areas of broadleaf woodland, with small patches of tall herbs. As the burn flows through Creetown, the land use becomes more suburban with some broadleaf.

Approximately 8km of the main stem was surveyed from the tidal limit at Creetown to the coniferous woodland at Craig Hill. Approximately 300m of the Culcronchie Burn was surveyed to the road bridge.

The survey was split up into six sections detailed in *Table 3*.

Table 3: Moneypool Burn habitat survey sections

Section ID	Location	Grid reference	Length (M)
MB1	Creetown to Kilwhirn Burn confluence	NX 473 589 to NX 478 596	800
MB2	Kilwhirn Burn confluence to Chain Bridge	NX 478 596 to NX 487 600	1600
MB3	Chain Bridge to Chain Wood	NX 487 600 to NX 494 607	1000
MB4	Chain Wood to Culcronchie Burn confluence	NX 494 607 to NX 502 609	1800
MB5	Culcronchie Burn confluence to conifers	NX 502 609 to NX 528 621	2800
MBC1	Moneypool Burn confluence to Culcronchie Burn	NX 502 609 to NX 505 614	300

4.2 Accessibility And Obstructions To Fish Migration

Fish access is of prime importance with regards to the sustainability of salmonid populations, particularly salmon and sea trout which migrate up rivers to spawn. All 8km of the survey length was potentially accessible, given that sufficient flows are available during the migration period. While not surveyed, it is believed that migratory fish will be able to ascend the Moneypool Burn upstream of the survey length around Craig Hill and Gatehouse Station.

A total of 10 potential obstructions to fish migration were identified during the survey and are presented in *Table 4.*

Table 4: Potential obstructions to fish migration

			Grid reference	
ID	**Obstruction**	**Accessibility**	**Easting**	**Northing**
MB2	Waterfall	Yes (S/F)	248762	560075
MB3	Waterfall	Yes (S/F)	249389	560589
MB3	Fallen tree	Yes	249389	560589
MB4	Waterfall	Yes (S/F)	250147	561251
MB4	Waterfall	Yes (S/F)	250188	560897
MB5	Watergate	Yes	250693	561037
MB5	Watergate	Yes	250693	561037
MB5	Waterfall	Yes (S/F)	250874	561087
MB5	Waterfall	Yes (S/F)	250897	561110
MB5	Waterfall	Yes (S/F)	251097	561274

On the main stem between MB1 – 4 before the burn splits in two at the Culcronchie Burn confluence, 4 waterfalls and a fallen tree were recorded. All the waterfalls identified were passable and should be easily assessable at periods of high flow and spate conditions. A fallen tree identified in MB3 is passable at present, but should be removed as it is collecting debris and has the potential to cause a blockage.

The upper reaches of the Moneypool Burn at MB5 contained a number of potential obstructions to fish migration. Two watergates situated a short distance upstream of the confluence with the Culcronchie Burn were easily passable, but should be monitored in case of future debris collections. Three waterfalls were located at Foremore. While two were large and potentially problematic, all three were considered passable given that suitable flows are present (*Fig.1*). It may be that during drought years or periods of prolonged low flows, these waterfalls may prove impassable and limit fish access into the headwaters of the burn.

No obstructions to fish migration were identified in the 300m surveyed in the Culcronchie Burn.

Figure 1: Waterfall at Fore Moor

4.3 Instream Habitat

The instream habitat within the Moneypool Burn was generally good throughout the survey length. Sections MB1-3 supported good-excellent instream habitat, particularly for juvenile salmon. All three sections were generally the same in character, with a high % of boulder and cobble substrates present, creating numerous riffle and run flow types. A large mass of boulders combined with a run flow type, can potentially create abundant fish cover and many fish territories. Instream cover in sections MB1-3 was generally good to excellent.

Section MB4 was different in instream character to the other main stem sites. The % of bedrock in this section was high, which limited the amount of available instream cover. There was also a greater abundance of pool flow type, which is more suited to trout than salmon.

Where the burn effectively splits into two at the Culcronchie Burn confluence, the Moneypool Burn at MB5 becomes narrower and more stable. MB5 supports good-excellent juvenile habitat (*Fig.2*), with a high % of cobble and pebble substrate, with some boulder. This section of the burn potentially supports the best fry habitat, with numerous shallow riffles and runs present. There are a few areas of the burn at MB5 which flow over bedrock, particularly at Fore Moor, which will limit instream cover.

Figure 2: Example of excellent instream habitat on the Moneypool Burn (MB5)

The 300m of Culcronchie Burn (MBC1) surveyed supported some good instream habitat. The burn is generally quite steep in nature and is more suited to trout rather than salmon. The substrate is generally composed of boulder and bedrock, with riffle and pool flow sequences.

4.4 Spawning Habitat

The upper Moneypool Burn at section MB5 generally supports the best and most abundant spawning habitat for both trout and salmon. This section was stable and supported extensive cobble and pebble beds.

Spawning habitat in the main stem sections (MB1-4) was largely poor to moderate. The main stem is generally of a high energy nature, with a high gradient, consisting of larger substrate

such as boulder and bedrock. Cobble and pebble preferred by salmon and trout, are largely confined to small pockets at the tails of pools.

The Culcronchie Burn was relatively steep, with spawning confined to small pockets of pebble and some cobble. Spawning habitat in this burn was considered to favour trout rather than salmon.

4.5 Riparian Habitat

Fish cover in the riparian habitat tends to be dominated by trout rather than salmon. Trout prefer to utilise undercut banks, root wads and draped vegetation along the riparian zone, rather than instream cover provided by cobble and boulders.

Riparian fish cover was highest in sections MBC1 and MB5, where the burn splits in two and becomes narrower. At these sections, bankside fish cover is more abundant on the main stem, with undercut banks, root wads, draped vegetation, and large rock providing cover (*Fig.3*). Both these tributaries were considered to support the best riparian habitat in the catchment.

Figure 3: Good riparian habitat – fish cover provided by root wads, draped and undercuts

The main stem sections MB1-4 were relatively wide, with little or no fish cover along either bank and trout habitat was therefore limited to pools.

Land uses within the riparian zones were primarily dominated by broadleaf woodland in sections MB1-4 and MBC1, with some tall herb in sections where suitable light is available. MB5 contained a mixture of broadleaf woodland and rough pasture dominated by sheep grazing.

4.6 Over-shading

Over-shading was found to be a persistent problem throughout sections of MB1-4, which are dominated by broadleaf woodland on either bank. Shading in all four sections ranged from 70 – 90%. While some shade is recommended (ideally 50% as recommended in the *Forests and Water Guidelines 4th Edition*), too much shade can lead to shading-out of other vegetation types. Tall herbs and scrub provide a source for terrestrial invertebrates in which fish rely on for

food, as well as a source of important draped fish cover. With the exception of MB1 at Creetown, both these vegetation types appeared to be lacking on the man stem.

Sections MB1-4 would greatly benefit from some coppicing of branches and thinning out of the woodland to improve light levels reaching the burn and both banks.

4.7 Over-grazing And Trampling

One area of MB5 at Fore More was the only section of the burn suffering from over-grazing and trampling (*Fig. 4*). This part of the burn is unfenced from NX 506 610 – NX 508 610 (approximately 500m of both banks).

Figure 4: Over-grazing and trampling at MB5

In this case over-grazing has led to trampling of the left and right banks, which has increased the channel width and reduced instream cover. Trampling has reduced fish cover along both banks and has exacerbated erosion.

As this section of the burn supports the best spawning and juvenile habitat in the catchment, this section should be fenced or have some other stock exclusion in place to avoid further degradation.

5 ELECTROFISHING RESULTS AND DISCUSSION

5.1 Figures Presented

The results of the electrofishing survey from 2007 are outlined in *Table 5*. Information on juvenile salmonid densities, as well as site number, tributary, location, O.S. grid reference, area fished (m^2), non-salmonid species and date of survey is included.

With regard to the fish densities tabled, these are separated into four categories which are defined below:

Salmon Fry (0+):	refers to young salmon, less than one year old resulting from spawning at the end of 2006.
Trout Fry (0+):	refers to young trout, less than one year old resulting from spawning at the end of 2006.
Salmon Parr (1+ and older):	refers to young fish of greater than one and greater than two years old (where present) from spawning years 2005 and 2004.
Trout Parr (1+ and older):	refers to young fish of greater than one and greater than two years old (where present) from spawning years 2005 and 2004.

5.2 Electrofishing Results

Site 1 – Moneypool Burn at Creetown

This site was chosen to assess juvenile densities in the lower reaches of the burn and was situated a few 100m upstream of the tidal limit.

Healthy densities of juvenile salmon and trout were recorded at this site. A moderate density of salmon fry (>12 per $100m^2$) were recorded along with a very good density of salmon parr (>12 per $100m^2$). While trout fry numbers were low (>6 per $100m^2$), trout parr numbers were also very good (>15 per $100m^2$). Eels were also recorded at the site.

A range of depths were recorded within the site, with the majority being under 20cm deep.

Substrates were dominated by cobble and boulder, which provides good instream cover for salmon parr. Some pebble and gravel was also present. The flow was generally comprised of run, shallow glide and riffle.

While instream cover was good, there was only a small amount of fish cover (10%) on the right bank, provided by a small undercut with some draped vegetation. The left bank provided no fish cover and was 100% bare. Canopy cover was provided by broadleaf trees on the right bank.

Site 2 – Moneypool Burn – Road bridge at Chain Wood

This site was located at Chainwood and was below the road bridge. This site was chosen to assess juvenile production in the middle reaches of the catchment.

Both salmon and trout were present at this site. Salmon fry numbers were good (>33 per $100m^2$), while salmon parr numbers were very good (>11 per $100m^2$). Low numbers of trout fry (>2 per $100m^2$) and trout parr (>3 per $100m^2$) were recorded at the site. A few eels were also recorded.

Water flow depths up to 40cm were recorded at this site. The upper section of the site was predominantly of run, while the lower section was a mixture of shallow and deep glide flows. Substrate was dominated by cobble and boulder, with some small pockets of pebble.

With such a high % of boulder (50%), instream cover for parr was regarded as good. Both banks were recorded as bare (100%) and supported very little cover. Canopy cover was provided by large broadleaf trees on either bank and was regarded as optimum for fish cover and primary production (50%).

Site 3 – Culcronchie Burn

This site is located 30m downstream of the road bridge at Culcronchie Farm. A low density of salmon fry (>6 per 100m^2) were recorded at this site, while salmon parr were absent. Trout fry numbers were also low (>8 per 100m^2), while trout parr numbers were moderate (>7 per 100m^2). A good number of eels were also recorded at this site.

A range of water depths were recorded at the site, predominantly between 11-40cm. Boulder and cobble were the dominant substrate, with also an area of bedrock, some pebble and gravel present. The substrate was generally stable and uncompacted. The flow was composed primarily of run and deep glide, with some riffle and shallow glide also present.

Instream cover was classed as moderate, as areas of bedrock which provide little fish cover was present. Bankside fish cover was low on both banks, with only a small % (10) available on the left bank from a group of large rocks. Canopy cover was high at 60%.

Site 4 – Moneypool Burn at Fore Moor

This site is located approximately 60m upstream of the confluence with the Culcronchie Burn. This site was surveyed to assess salmonid accessibility and juvenile production in the upper catchment.

An excellent density of salmon fry (>134 per 100m^2) were recorded at this site. Salmon parr numbers were low (>2 per 100m^2). Trout densities were low (>2 per 100m^2), while trout parr densities were moderate (>6 per 100m^2). A good number of eels were also recorded.

Water depth of up to 30cm were recorded, with the majority <20cm. The flow was mainly comprised of run (50%), with some shallow glide and riffle. The substrate was mainly composed of pebble (30%) and cobble (40%), with boulder, gravel and sand also present. The substrate was stable and uncompacted.

Instream fish cover was generally good. Bankside fish cover was also good, with undercut cover on the right bank and draped fish cover on the left bank. Canopy cover was moderate at 40%, provided by a few broadleaf trees on either bank.

Table 5: Juvenile Salmonid Population Densities (per 100m^2) Present During Electrofishing Survey Of The Moneypool Catchment, Summer 2007

Site No	Watercourse	Location	Grid Ref	Date of Survey	Presence of Other Species*	Area Fished (m^2)	Density per 100m^2			
							Salmon Fry	Salmon Parr	Trout Fry	Trout Parr
1	Moneypool Burn	Upstream of tidal limit at old bridge in Creetown	247500 559000	13/6/07	E	136.5	>12	>12	>6	>15
2	Moneypool Burn	Road bridge at Chain Wood	248800 560100	13/6/07	E	89.8	>33	>11	>2	>3
3	Culcronchie Burn	30m d/s of road bridge at Culcronchie Farm	250600 561300	13/6/07	E	84.6	>6	0	>8	>7
4	Moneypool Burn	60m u/s of Culcronchie Burn confluence	250600 561100	13/6/07	E	98.4	>134	>2	>2	>6

*** Other Fish Species**
E = Eel

6 Discussion

6.1 Habitat

Both instream and riparian habitat in the Moneypool Burn catchment is generally quite good for both juvenile trout and salmon.

A number of potential obstructions to fish migration were recoded during the survey, mainly waterfalls, watergates and a fallen tree. The waterfalls between MB1-4 were expected to be easily accessible when sufficient flows are available. A number of waterfalls that were closely situated in MB5 at Fore Moor, were believed to be passable given sufficient flows, but due to their relatively large size, may prove problematic during drought years. The fallen tree recorded at MB3 should be removed to avoid future debris collection and blockages.

The habitat on the main stem sections before the burn effectively splits in two at the Culcronchie Burn confluence (MB1-4), is generally more suited to salmon rather than trout. Much of the fish cover tends to be instream, provided by an abundance of large boulder and cobble in which salmon tend to dominate and thrive. Bankside fish cover in which trout dominate is fairly low in these sections and trout habitat tends to be confined to pools or slower flow types such as glide.

The Culcronchie Burn (MBC1) and upper Moneypool Burn (MB5) are narrower in width and provide more bankside fish cover from undercut banks, root wads and draped vegetation, and therefore provide more suitable habitat for juvenile trout production. Juvenile salmon habitat is also good in the upper Moneypool Burn, with good instream cover. The Culcronchie Burn is generally more suited to juvenile trout rather than salmon.

The quality of spawning habitat varied throughout the survey length. Much of the spawning habitat between MB1-4 was generally classed as moderate, as spawning was confined to small pockets of cobble and pebble. The substrates in these sections are quite large with an abundance of boulder and bedrock present. The cobble present is generally quite large and therefore it was considered that these sections were more suitable for salmon spawning than trout.

Spawning in the Culcronchie Burn is much the same with small pockets of pebble and small cobble present at the tail of most pools. The substrate recorded in this burn was more suitable for trout spawning.

The upper Moneypool Burn (MB5) supported the best spawning habitat in the catchment. The gradient in this section was much lower than in other sections surveyed and numerous cobble and pebble beds were therefore present. This burn supported good spawning substrate for both salmon and trout.

With much of the land use consisting of predominantly broadleaf woodland within the riparian zone, over-shading was a persistent problem in sections MB1-4. Improving light levels in these sections would greatly improve productivity in these sections.

Over-grazing and trampling was only considered a problem in one section of the burn in section MB5 at Fore Moor. This situation has exacerbated erosion and has reduced both instream and bankside fish cover. As this survey has highlighted this section of the burn as an important area

for juvenile production and spawning, GFT would recommend that both banks are fenced to avoid further degradation.

6.2 Electrofishing

6.2.1 Site 1 Moneypool Burn at Creetown

Juvenile densities at this site were generally quite healthy, particularly for salmon. Salmon parr numbers were very good and reflected the good instream cover which was present. Trout fry numbers were low, while trout parr numbers were very good and were generally located in areas of pool and glide.

6.2.2 Site 2 Moneypool Burn at Bridge at Chain Wood

Good salmon habitat was present at this site with boulders and a run flow type, providing good instream cover. Densities of juvenile salmon at this site were healthy, with good fry and very good parr numbers present.

Trout densities at this site were low, which was surprising given that suitable habitat was present (30% of the flow consisted of shallow and deep glide, preferred by trout).

6.2.3 Site 3 Culcronchie Burn

The habitat in the Culcronchie Burn was considered to be more suitable to trout rather than salmon, although the presence of low numbers of salmon fry in this burn confirmed that salmon are able to ascend the waterfalls downstream.

Low numbers of trout fry and moderate densities of trout parr were recorded at this site. Given that small tributary streams are regarded as prime spawning areas for trout, the lower densities of trout fry recorded than what would normally be expected from a catchment noted for sea trout, would suggests that a lack of adults are returning to spawn in this particular area of the catchment.

6.2.4 Site 4 Moneypool Burn at Fore Moor

Excellent densities of salmon fry were recorded at this site, which was surprising and unexpected, given that much lower densities were recorded elsewhere in the catchment. The high density of salmon fry highlights the importance of this particular part of the catchment for spawning. The instream habitat although good, was relatively shallow in depth (more suited to fry), and this was reflected in the low numbers of salmon parr that were recorded. The presence of both age classes of salmon in the upper reaches of the catchment suggest that no problems with accessibility, regarding waterfalls in the middle reaches appears to be present.

Trout densities for both fry and parr were low. Given that this site supported some of the best trout habitat in the catchment, with good bankside fish cover and spawning habitat present, trout would be expected to thrive. The low densities recorded further emphasises the lack of adults returning to spawn in this part of the catchment.

7 Conclusion

There are a number of conclusions that can be drawn from both the electrofishing and habitat surveys.

7.1 Habitat

1. The Moneypool Burn generally supports good habitat for both salmon and trout.

2. The habitat in the main stem below the Culcronchie Burn confluence is more suited to salmon rather than trout.

3. The Culcronchie Burn and upper Moneypool Burn support good habitat for trout, as well as salmon.

4. The upper Moneypool Burn supports the best spawning habitat in the catchment.

5. The habitat surveyed in the Moneypool Burn does not appear to be limiting juvenile production in the catchment.

7.2 Electrofishing

1. Salmon and trout were distributed throughout all of the survey sites.

2. Densities of juvenile salmon appeared to be very healthy, particularly in the upper Moneypool Burn.

3. Trout densities were low to moderate and very low in the upper catchment where it was expected to be an important area for trout production.

4. The low densities of juvenile trout recorded in the upper catchment would suggest that few adults are returning to this part of the catchment to spawn.

7.3 Decline in Solway Sea Trout Stocks

There has been great concern in the last few years with regards to falling sea trout catches across the Solway region. In Dumfries and Galloway the known sea trout rivers: the Border Esk, Annan, Nith, Water of Fleet, Cree, and Luce, have all recorded declines in the rod fishery. Whilst sea trout stocks have undergone periodic fluctuations in the past, the decline in both the rod and net fisheries, has led to catches falling to an all time low in the data series collected since 1952.

As declines have been noted in all rivers, it is likely to be a problem in the marine phase of the sea trout life cycle, rather than the freshwater phase. GFT has found that juvenile trout stocks in freshwater nursery areas continue to be healthy. A number of reasons for the decline have been suggested: increase in the level of netting at sea, under reporting of catches, drought conditions meaning fish are spending longer at sea, fish are running later, reduction in food supplies, and increased predation. The most commonly believed reason for the decline is changes in sea temperature. It is considered that increased estuarine temperatures may affect

sea trout populations in a variety of ways, either through changes in their behaviour (and/or their predators/prey) or that stressful environmental conditions have been created for the fish.

While more work is to be undertaken to ascertain the extent of problems at sea, it is likely that changes in Solway sea trout numbers may only be another symptom of a global problem.

Recommended Actions To Improve Trout Habitat

1. Fence both banks of the Moneypool Burn at Fore Moor (MB5- NX 506610 – NX508610).

2. Coppice branches and thin out woodland on main stem of the Moneypool Burn between Creetown and the Culcronchie Burn confluence (MB1-4, NX 473 589 – NX 611 505).

3. Monitor trends in juvenile salmon and trout abundance in the Moneypool Burn, by carrying out annual or biannual electrofishing surveys.

4. Expand electrofishing survey to include a greater number of sites to determine distribution, as well as juvenile abundance and production in other areas of the catchment.