



ELECTRO-FISHING REPORT 2009 – GALA CATCHMENT

The electro-fishing programme carried out as part of the Living North Seas programme aims to build on and extend what is known about the distribution of juvenile salmonids within the Tweed catchment. Trout sites in particular, have been increased as part of the Living North Seas work.

Electro-fishing at monitoring sites is the basic tool for building up a picture of the variation in numbers of juvenile Salmon and Trout throughout the Tweed Catchment over time. We are currently establishing a new network of sites throughout the Tweed and Eye catchments with the aim of sampling them every three years. As we continue to return to these sites, our understanding of the factors affecting the numbers of juvenile fish, both natural and man-made, will improve. It is with this information that appropriate management decisions can be recommended, such as measures to reduce the exploitation of returning Salmon or the adult trout that spawn the next generation of juvenile fish (e.g. catch regulations) or through habitat restoration.

The sites electro-fished are generally fast-flowing, relatively shallow areas in the main channels and larger side burns which are the preferred habitat of Salmon Fry (first year fish). Trout by contrast dominate the smaller tributaries and burns where they spawn.



A typical electro-fishing site

The life cycle of Salmon and Trout

To understand the results provided on the following pages, a brief guide to the life cycle of Salmon and Trout is provided :-



The fry are “the young of the year” that are spawned in the Autumn and emerge out of the gravel around April / May. By summer these fish are 5 or 6 cm in length.

(picture – a Salmon fry recently emerged)



Parr are fish that are one year or older. Features of Salmon Parr that can be used to distinguish them from Trout Parr include distinctive Parr marks along the flank, a dot on the gill cover, a more forked tail and generally an absence of red in the tail and adipose fin.

(picture – Salmon Parr (top), Trout Parr (bottom))



Most Salmon Parr leave the river in the Spring as Smolts at a length of around 12 cm (at 2 or three years of age). Trout Parr on the other hand either drop down into the main river to become adult Brown Trout or become Smolts in spring time and go to sea to become Sea Trout.

(picture – Salmon smolt)



Adult Salmon and Sea Trout typically return from the sea after 1 or 2 winters, although some Sea Trout may return after the first summer. Adult fish commonly return to their stream from which they were spawned to ensure that adaptations to the local environment are passed onto their offspring.

(picture – adult Salmon (top), adult Sea Trout (bottom))



ELECTRO-FISHING RESULTS

The evaluation of sites are carried out primarily for Fry :- numbers are quite variable due to high natural mortality, but this age class indicates the spawning success in the immediate vicinity of each monitoring site the previous Autumn since they do not generally disperse very far from where they were spawned. In areas where adult fish are expected to spawn, low numbers of fry would indicate a lack of spawning fish or a problem in the local environment which can then be investigated further.

To present the results for each site, numbers of Fry for all previously sampled sites in the Tweed catchment have been ranked from lowest to highest values and six categories defined. Each result has then been assigned to one of these six categories and displayed on the following maps (MAP 1 & MAP 2). Tables 1. and 2. show the annual changes for individual sites. Sites listed in the tables can be located using the site code number which matches the labels for sites shown on the maps.

OTHER FISH SPECIES

The presence/absence and simple abundance of other fish species is recorded at each monitoring site following policy 6.2 of the Tweed & Eye Fisheries District Management Plan :-

“Maintain a database of fish species distribution using data obtained during electro-fishing and other surveys.”



All three species of Lamprey (Brook, River and Sea) spawn within the Tweed Catchment, but individuals recorded at sample sites are nearly always in the larval stage. Only larval Sea Lamprey can be distinguished by eye. River and Sea lampreys migrate out to sea in Autumn after metamorphosing from their larval stage, returning to spawn as adults. The Brook Lamprey remains in freshwater as an adult, but does not feed at all before spawning.



The number and length of Eels are also recorded. There has been considerable international concern in recent years over the decline in numbers of Eels in European rivers and data from the Tweed has already contributed to one study.

Other fish species generally found at electro-fishing sites include :-



Baggies (Minnows)



Beardies (Stone Loach)



Stickleback

Based on the fish data recorded for each site, Map 3. shows the presence / absence found for each fish species.



SALMON FRY RESULTS

Moving
upstream

SITE CODE	ORD2	ORD3	ORD4	2006	2009
37	Gala Water			34	46
1	Gala Water			14	56
2	Gala Water			30	46
3	Gala Water			36	90
4	Gala Water			22	43
5	Gala Water			40	42
6	Gala Water			33	64
7	Gala Water			24	21
8	Gala Water			46	
9	Gala Water			12	17
566	Gala Water				15
11	Gala Water			13	
88	Gala Water			22	41
12	Gala Water			21	56
30	Gala Water			15	19
13	Gala Water	Heriot Water		22	8
14	Gala Water	Heriot Water		30	18
15	Gala Water	Heriot Water		22	11
16	Gala Water	Heriot Water		8	1
17	Gala Water	Heriot Water		24	7
18	Gala Water	Heriot Water	Blackhope Burn	12	0
19	Gala Water	Heriot Water	Blackhope Burn	17	14
22	Gala Water	Armet Water		9	5
23	Gala Water	Armet Water		7	16
24	Gala Water	Armet Water		2	6
25	Gala Water	Lugate Water		21	66
26	Gala Water	Lugate Water		24	14
27	Gala Water	Lugate Water		9	22
28	Gala Water	Lugate Water		9	7
29	Gala Water	Lugate Water		0	0
667	Gala Water	Lugate Water	Ewes Water		0
668	Gala Water	Lugate Water	Sil Burn		0
675	Gala Water	Comely Burn			1
676	Gala Water	Brockhouse Burn			4
677	Gala Water	Corsehope Burn			0
678	Gala Water	Corsehope Burn			2
679	Gala Water	Armet Water	Brothershiels Burn		0
681	Gala Water				3
683	Gala Water	Heriot Water	Garvald Burn		0
685	Gala Water	Heriot Water	Dewar Burn		0
796	Gala Water	Heriot Water	Dewar Burn		0
Overall average				19.43	18.82
average (Gala Water main channel only)				23.67	30.75
Average (Gala Water to Lugate Water confluence)				26.69	44.75
Median (main channel)				22.00	20.00

Table 1. Salmon Fry results (number caught per three minutes). Site numbers can be located using maps 1 or 2. Colour coding in the table is according to category of results (number caught per 3 minutes):-

0-4 fry (Very low) = ■, 5-12 fry (low) = ■, 13-20 fry (moderate) = ■,
 21-29 fry (high) = ■, 30-84 fry (very high) = ■



TROUT FRY RESULTS

Moving upstream

SITE CODE	ORD2	ORD3	ORD4	2006	2009
37	Gala Water			5	4
1	Gala Water			7	0
2	Gala Water			1	1
3	Gala Water			5	12
4	Gala Water			3	3
5	Gala Water			0	2
6	Gala Water			0	5
7	Gala Water			0	1
8	Gala Water			2	
9	Gala Water			0	0
566	Gala Water				0
11	Gala Water			3	
88	Gala Water			4	3
12	Gala Water			3	4
30	Gala Water			55	33
13	Gala Water	Heriot Water		6	10
14	Gala Water	Heriot Water		4	14
15	Gala Water	Heriot Water		8	9
16	Gala Water	Heriot Water		14	13
17	Gala Water	Heriot Water		41	15
18	Gala Water	Heriot Water	Blackhope Burn	25	15
19	Gala Water	Heriot Water	Blackhope Burn	6	12
22	Gala Water	Armet Water		3	4
23	Gala Water	Armet Water		13	39
24	Gala Water	Armet Water		12	20
25	Gala Water	Lugate Water		9	17
26	Gala Water	Lugate Water		9	40
27	Gala Water	Lugate Water		3	32
28	Gala Water	Lugate Water		7	28
29	Gala Water	Lugate Water		5	17
667	Gala Water	Lugate Water	Ewes Water		15
668	Gala Water	Lugate Water	Sil Burn		6
675	Gala Water	Comely Burn			15
676	Gala Water	Brockhouse Burn			19
677	Gala Water	Corsehope Burn			5
678	Gala Water	Corsehope Burn			25
679	Gala Water	Armet Water	Brothershiels Burn		40
681	Gala Water				33
683	Gala Water	Heriot Water	Garvald Burn		16
685	Gala Water	Heriot Water	Dewar Burn		37
796	Gala Water	Heriot Water	Dewar Burn		16
Average (repeated Upper Gala and tributary sites)				13.75	19.88
Median (repeated Upper Gala and tributary sites)				8.5	16

Table 2. Trout Fry results (number caught per three minutes). Site numbers can be located using maps 1 or 2. Colour coding in the table is according to category of results (number caught per 3 minutes) :-

0-4 fry (Very low) = ■, 5-12 fry (low) = ■, 13-20 fry (moderate) = ■,
 21-29 fry (high) = ■, 30-84 fry (very high) = ■



KEY FINDINGS

Salmon

The key finding from the results shown in Table 1. is that the average number of Salmon Fry for the Gala catchment decreased slightly from 19.43 to 18.82 between 2006 and 2009. The average for the main channel of the Gala Water (the key area for Salmon spawning) increased from 23.67 to 30.75 fry per 3 minutes, which can be attributed to increases at the first six sites (starting at the bottom of the Gala Water). An interesting observation is that ten out of eleven sites increased on the lower-middle sections of the Gala Water (sites 37-30) and seven out of seven sites decreased on the Upper Gala Water (sites 13-19). It is possible that a restricted number of Salmon were able to spawn in the Upper Gala Water section, perhaps due to low water conditions, These fish may then have spawned further downstream in the lower-middle sections instead. This observation is speculative at present, but further analysis using flow data may provide more evidence for this theory.

The consistent overall average provides a strong indication that the production of Salmon Fry from the Gala Water is at or near full capacity. As expected, the most consistent results were found on the main channel of the Gala Water, which is where Adult Salmon will find it easiest to reach each year. The tributary results were more variable between 2006 and 2009, most probably due to variable numbers of spawning adults that depend on ideal water levels to reach these areas.

The other measure of variability for Salmon Fry numbers is the consistency of results for individual sites, which can be measured using the colour coded classes. Some natural variation that cannot be explained will always be expected, which would be represented by a single change in category (e.g. yellow to light green) and to a lesser extent a change in two categories. Comparing 2006 to 2009, 11 results remained in the same category, 10 sites changed by only 1 and 6 sites by two categories. For a problem in fry numbers to be flagged up for further investigation, a decrease in two categories (e.g. light green to orange) for a group of main channel Gala Water sites would be required.

Trout

In contrast to the Salmon Fry results, the highest Trout Fry results were consistently found in the Gala Water tributaries and therefore these sites are the focus for the monitoring of Trout Fry numbers. Average Trout Fry numbers increased from 13.75 in 2006 to 19.88 in 2009 for tributary sites, the main cause of which was large increases in Fry numbers at all of the sites on the Lugate Water. The precise reason for these increases cannot be explained but repeat surveys will show whether this level of variation is natural and should therefore be expected.

Other fish species

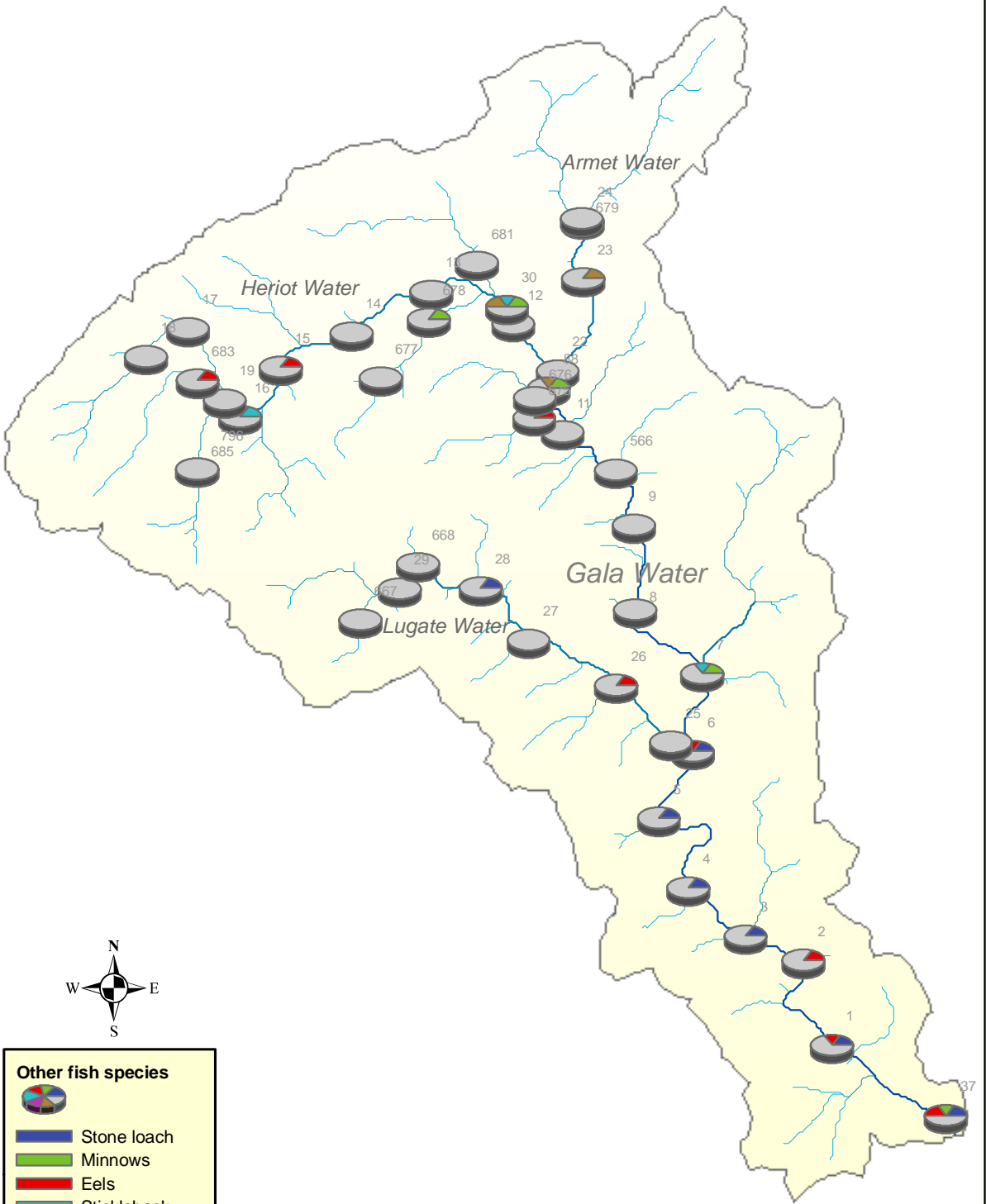
Since the survey work is focused on the habitat of Salmon and Trout Fry, other fish species may be present in the local area but are not detected because they are living in a different habitat. i.e. there is some element of chance in detecting their presence. For example, Minnows or Stickleback tend to be found in slower flowing water than Salmon or Trout. Map 3. is therefore only for general information and is not a definitive map of species distribution.

Gala fish counter

A fish counter is now located at the Skinworks Cauld next to B&Q in Galashiels and has been in operation since September 2006. After some initial teething problems in 2007, a count of 4065 fish was made for 2008, 1834 were classified as Salmon and 2218 as Trout. Given that the target number of Adult Salmon required to fully stock the Gala Water with the next generation of fish is 684, the Salmon total through the fish counter exceeded this by nearly three times. It is therefore highly likely that the Gala Water was fully stocked with juvenile Salmon Fry in 2009 and it will be very interesting to see whether such high numbers of Salmon continue to be counted by the fish counter each year and whether the Salmon Fry numbers continue the stability shown from 2006 to 2009.



MAP 3. Other fish species results (2009)



Other fish species

- Stone loach
- Minnows
- Eels
- Stickleback
- Grayling
- Larval Lamprey
- No fish

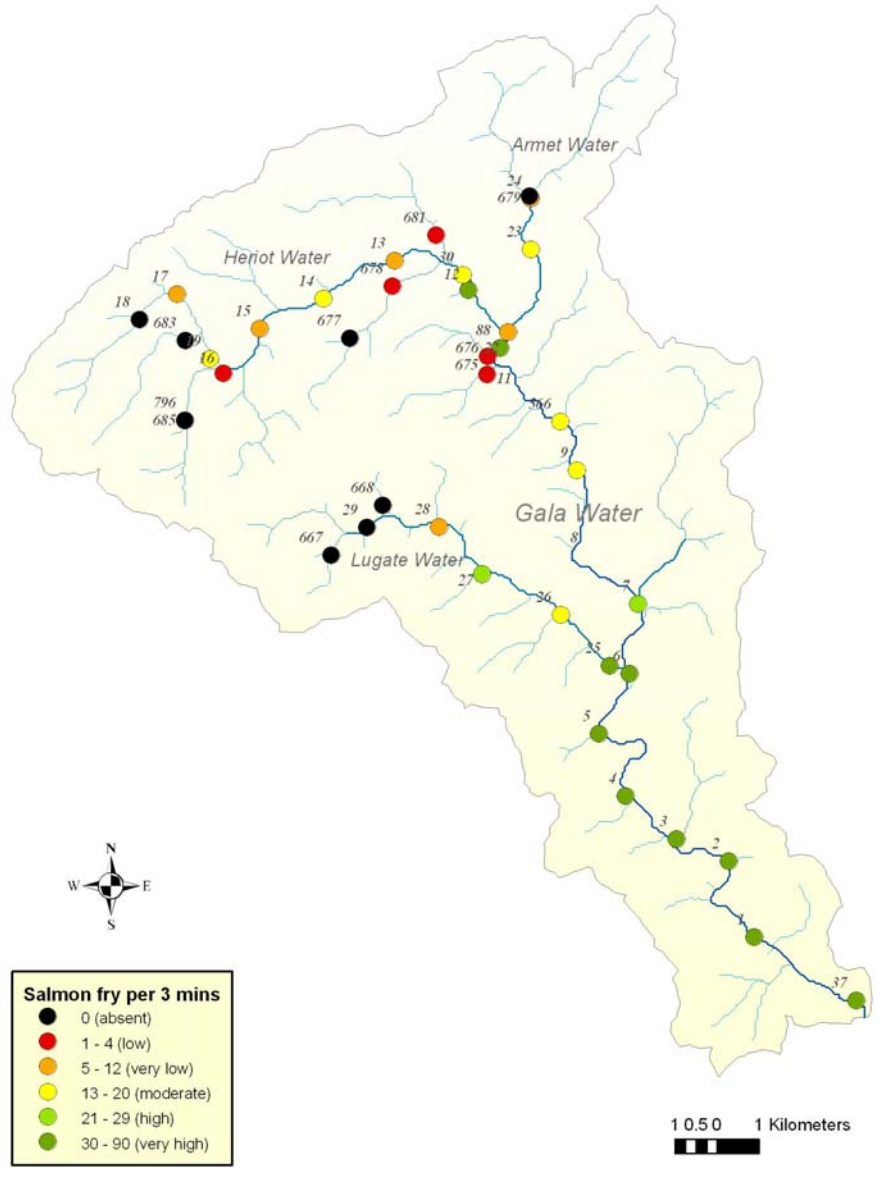


1 0.5 0 1 Kilometers

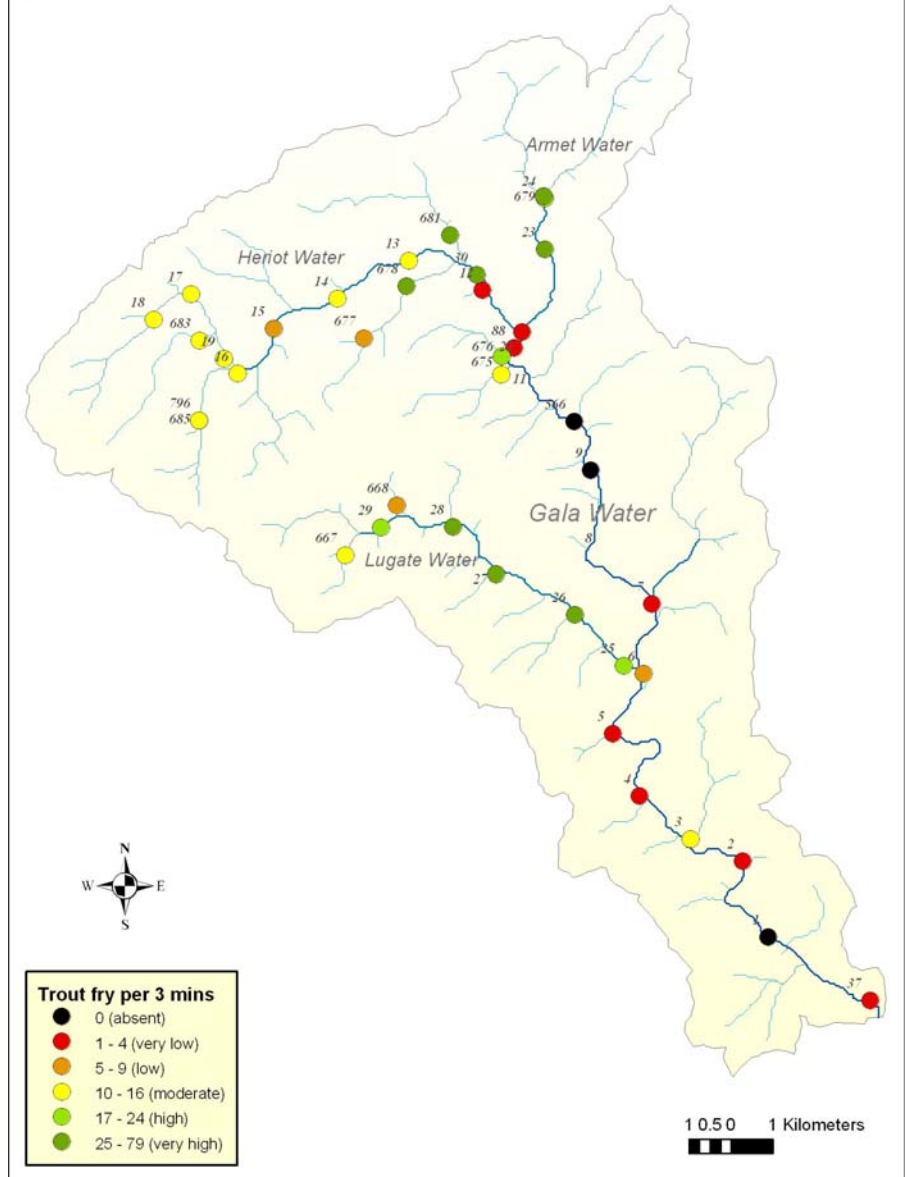
Map 3. Presence or absence of other fish species.



MAP 1. Salmon Fry results (2009)



MAP 2. Trout Fry results (2009)



Maps 1. and 2. show a typical distribution of Salmon and Trout Fry – good or excellent numbers of Salmon fry in the main channel of the Gala Water & lower sections of the main tributaries and good or excellent numbers of Trout fry in the smaller tributaries.