

Electric fishing survey of the gravel addition sites on the River Wyre, Grizedale Beck and Joshua's Beck.

Surveyed in September 1996 by:

Darryl Clifton-Dey
Steve Leech
Grant Talbot
Geoff Wharton

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Introduction

Although geographically the River Wyre lies between two rivers containing major migrations of adult salmon and sea trout, its rod & line fisheries have for a number of years produced exceptionally low catches. In order to determine the causes of this the Wyre Salmon and Sea trout Restoration Group (WSSRG) was conceived in 1994 as a partnership between the then National Rivers Authority (now Environment Agency), local landowners, angling clubs and interested parties.

An electric fishing survey of the catchment was completed in 1992 which led to further investigations by W.M. Shearer (1994) and the APEM consultancy (1995). The major findings of these reports were that there is a shortage of useable spawning gravels on the river. This is compounded by Abbeystead Reservoir acting as a gravel trap, the siltation of gravels on several side becks and problems with access to available gravels by returning adults. There was also perceived to be a need for accurate fishery data from the river encompassing redd counts, catch data and surveys of fry populations.

The report by the APEM consultancy suggested a number of management proposals which might be adopted in order to improve and create available spawning habitat for migratory salmonids. Funding was made available to create three spawning gravels on each of two side becks (Grizedale Beck and Joshua's Beck) and the addition of gravels to a site on the main river below Abbeystead Reservoir. Modifications were also made to the fish pass at Abbeystead to allow easier passage of fish. These improvements were made in the autumn of 1995. Salmonid spawning redd counting was undertaken on the whole Wyre catchment in 1995/1996 and specific surveys by electric fishing on the gravel enhancement sites in the summer of 1996.

This report details the current state of the improvement works that were undertaken and presents the results of electric fishing surveys in September 1996. A number of lessons have been learnt which will be of great benefit to the Fisheries Function in other parts of the Wyre catchment and the Central Area in general.

Redd counts

During the 1995/96 redd counting season a total of 25 salmon and 55 sea trout redds was found on the River Wyre catchment. No redds were found on Joshua's or Grizedale becks either on or away from the gravel addition sites.

Salmon fry and microtagged parr planting 1996

Salmon fry and microtagged parr were planted in the Wyre catchment in 1996 (from River Lune broodstock) although not in the side becks containing the spawning gravel sites. Any salmon juveniles found on the electric fishing surveys undertaken in 1996 can therefore only have been spawned in previous years or migrated into the side becks from other areas on the main river. These surveys can therefore be considered as a baseline with which future changes can be compared.

Electric Fishing surveys

Electric fishing surveys on and around the gravel addition sites were undertaken in September 1996. In the course of these surveys a number of different fish species were caught including 29 salmon juveniles and 61 trout. Examination of the length frequency distribution for these salmonids made it possible to separate these species into 0+ and older than 0+ age classes (Figures 1 and 2). For the purposes of this report, all salmon less than 90mm and all brown trout less than 95mm were considered as being of the 0+ age group.

Figure 1

Salmon

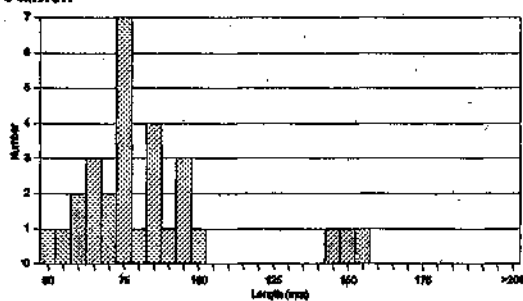
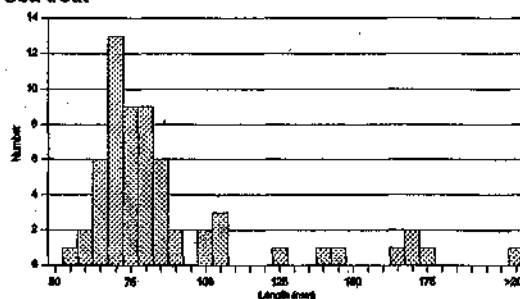


Figure 2

Sea trout



Gravel seeding

Joshua's Brook

The gravel addition sites on Joshua's Brook suffered in 1995 and 1996 from extended periods of low flow. This resulted in the beck being little more than a series of unconnected pools for much of the time. This has both been unsuitable for fish survival and also not allowed the added gravels to stabilise. Consequently, rainfall has resulted in erosion of gravel at bends in the beck and its movement downstream. At the time of surveying, the beck consists of four small pools below the pipe bridge and a number of unconnected pools above. These pools were surveyed by electric fishing with a single anode, results are shown in Table 1. Given the small area at each site it can be reasonably assumed that all of the fish present in the pools were caught.

Table 1. Results from electric fishing survey on Joshua's Beck.

Site number	Site description	Area length x width x depth	Species present
1	Pool above pipe bridge	5m x 2m 0.7m	7 trout fry 3 trout parr or older
2	Pool below pipe bridge	3m x 4m x 0.7m	1 salmon fry, 1 salmon parr, 12 trout fry, 3 trout parr, 33 minnow, 1 bullhead
3	Pool at top gravel site	8m x 1.5m x 0.25m	7 trout fry, 1 trout parr, 69 minnow, 1 eel.
4	Pool at middle gravel site	7m x 1.5m x 0.1m	Nothing present
5	Pool 20m above confluence	2m x 1m x 0.5m	72 minnow, 1 stickleback

The results from this survey indicate that this beck does have the potential to produce and rear trout and, to a lesser extent, salmon fry and parr provided that there is adequate flow of water to cover any redds until the eggs hatch. Although a proportion of the added gravels have moved, it is likely that a significant amount will be stable and available for redd cutting in the 1996/1997 spawning season. Low flows may cause surviving juveniles from any redds to drop downstream and into the main river during the summer months. This may not be a problem provided there is sufficient access.

Improvements could be made at this site to prevent erosion of land. Fences could be erected and trees planted to prevent sheep grazing to the edge of the beck and to stabilise the banks. This fencing and planting need only be constructed along both bank of the beck below the pipe bridge, a distance of approximately 150 metres. This will be relatively cheap to erect and still allow watering of stock in the area of beck above the pipe bridge. The permission of the land owner is required for this improvement work.

Main River gravel addition

A large volume of gravel was added to the main River Wyre below Abbeystead Reservoir at the Pumphouse Ford. This was added in the autumn 1995, immediately prior to a flood which moved a large volume of material downstream towards the confluence with Joshua's beck. At the time of surveying there was very little material where it was originally laid, the majority having moved downstream and onto the banks creating what could be considered as very good spawning and fry habitat. In the summer of 1996 this area received approximately 20,000 salmon fry from the Witcherwell Hatchery.

Two areas of the main river were surveyed: where the gravels were originally positioned, and where they have finally ended up. Surveys were with 2 anodes each for 5 minutes. This survey can be considered as being very inefficient but does determine whether the area is being used by juveniles.

Table 2. Results of electric fishing on main River Wyre

Site number	Site description	Results
1	Main river above Pumphouse Ford	1 salmon parr, 2 trout parr, 3 eels, 10 minnows
2	Main river opposite pipe bridge on Joshua's beck	11 salmon fry, 1 trout fry, 5 bullhead, 1 stone loach, 1 eel

Although the gravels added at this site have not remained where they were originally intended they have created an area of good fry habitat where they were deposited. This area would also appear to be ideal for spawning adults and should be utilised for redd cutting. The presence of some gravels on the dry margins of the river is also not cause for concern since these are likely to be carried by future flood waters to areas of the river where they may become stable and available for spawning.

This approach to gravel enhancement would appear to have been a success although not in the way originally intended. Further inputs of suitable gravels should be considered for future years in mitigation for the gravel trapping effect of Abbeystead Reservoir. This type of addition is very cheap since no special structures are required, and can be effective. However, the impact of this work on the flooding potential of the river must be considered as must the stability of gravel shoals created by the river's actions. Redds cut on unstable gravels that are subsequently shifted on floods or become dry at periods of low flows can be considered as a loss of eggs to the Wyre system. If gravels are added to the river or piled onto the banks in the spring, after the previous years eggs have hatched, subsequent floods should move them to suitable areas and allow them to stabilise, therefore making them available for redd cutting by adults in winter.

Grizedale Beck

The spawning gravel addition sites on Grizedale beck have remained almost intact to the present date and, although fairly heavily silted, appear to be ideal sites for salmonid spawning. Electric fishing surveys were undertaken on the gravels themselves and in areas above and between gravel addition structures using a single anode and upstream stopnets.

Table 3. Results from electric fishing of Grizedale Beck

Site Number	Site Description	Fish Caught per 100m ²					
		0+ Sal	>0+ Sal	0+ Tr	>0+ Tr	Eels	MCS
1	Above roadbridge at Woodacre Hall	-	2.63	23.7	-	-	81.6
2	300m downstream roadbridge	-	-	3.6	-	7.1	24.9
3	Top gravel addition site	2.1	-	2.1	-	18.8	81.3
4	Area between top and middle gravel addition sites	2.3	9.0	4.5	-	2.3	90.4
5	Middle gravel addition site	-	-	2.3	1.1	9.1	77.7
6	Area between middle and bottom gravel sites	1.1	-	1.1	-	9.7	118.8
7	Bottom gravel site	10.9	-	4.7	3.1	17.2	212.5

Key: Sal = Salmon, Tr = Trout, MCS = Minor Coarse Species (Bullhead, Minnow, Stoneloach and Stickleback)

These results indicate that salmon and trout juvenile populations are present both on and between the gravel addition sites with no apparent preference for either. These populations include salmon and trout fry despite there being no redds found on the beck in the 1995/96 spawning season. These fry must therefore have migrated into the beck from the main river spawning redds or from fish introductions.

The spawning gravels on Grizedale Beck have remained where they were laid and are available for redd cutting in the 1996 spawning season. Prior to this time the gravels should be raked to remove silt deposits. The siltation of Grizedale Beck is an ongoing problem with likely inputs from the reservoir, road run-off and farmland. This may have a subsequent effect on the survival of eggs laid in the beck and any redds cut must be carefully monitored.

Conclusions

Although the gravel addition sites were not used by adult salmonids during the 1995/96 spawning season there is no reason to believe that they will not be used in future years. The gravels have now had a chance to settle and stabilise and will be in a better condition for redd cutting in 1996 than they were in 1995. Improvements to these spawning sites have been suggested which, at a small cost in terms of time and money, might increase their value to the catchment. Lessons have been learnt concerning the siting of gravel addition sites and future improvements might be performed in different ways. It has however been a very useful learning experience for all concerned.

The results from the electric fishing surveys undertaken on the gravel addition sites in September 1996 provide a baseline figure for the populations of salmonid juveniles present in these areas. These surveys should be repeated each year in late summer to allow the fry to attain a size whereby they can be caught with electric fishing equipment. This information, combined with redd counts, will help to determine both the use of the spawning gravels and their fry production. It is vital that these surveys continue since without accurate fisheries data there is no means of determining any improvements in salmonid production to the Wyrè system.