



(2011) Semi-quantitative electro-fishing survey

River Exe



Photograph of Bridgetown Weir L.Exe. Post improvement works for fish access October 2011.

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The River Exe Project is financially supported by the following organisations:



With financial support from the Exmoor National Park Sustainable Development Fund, provided by DEFRA

Exe Mitigation Group, River Exe Foundation and Dulverton Angling Association (DAA)

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1. EXECUTIVE SUMMARY

- In the summer of 2011 the Westcountry Rivers Trust carried out a 5 minute electro-fishing survey of salmonid fry habitat across the Upper Exe catchment. The survey targeted areas sampled in previous years, including the Little Exe and its tributaries the Quarme and Haddeo, plus the Lowman and the Upper Culm.
- The results from the annual sites fished by the Environment Agency are also included in the report, as this combined approach provides better coverage of the system. Where required sites were sampled every kilometre down the river as per the normal survey methodology, if not every other site was fished.
- Salmon production on the Little Exe is generally most successful in the upper river. Again, this was found to be between Exford and Winsford. Once again the salmon did not reach the very upper spawning areas above Westermill Farm on the Little Exe in any numbers, although they did make it up to Codsend Bridge on the Quarme. Overall the salmon abundance was fair/good but this was a big drop from the previous year. Excellent abundance was found at 18% of sites, 35 % sites showed Good abundance, 29% Fair abundance, 12% Poor and 6% absent.
- Overall the brown trout abundance on the Little Exe was fairly poor in 2011. Like salmon, the abundance of trout fry was also worse than last year, with no Excellent or Good sites. Overall the results showed Fair abundance at 28%, Poor at 67% and absence of fry at 5% of sites. However, as we know from previous surveys the trout do push right up into the tributaries and very upper reaches, which we did not survey, so some caution should be taken when interpreting the data.
- Comparing the overall order of salmon fry production in the Exe Catchment, highlights the importance of the different parts of the catchment. The highest abundance was from:

Silly Bridge (u/s Exford) all the way down to Miltons (d/s Bridgtown) is Good (B) > Haddeo Lower d/s Bury (Good(B)) > Quarme (Fair (C)) > Lower Little Exe below Miltons (Fair (C)) > Pulham (Poor (D)) > Lowman (Poor/Absent E/F)) > Culm (Poor/Absent (E/F)) > Haddeo u/s Hartford (Absent).

- Unfortunately the improvement seen in the L. Exe system over the last few years was not maintained in 2011. The results are more in line with 2006 & 2008. From the perspective of the rod catch, the salmon run did not appear to be very different to the previous year, with 404 salmon caught in 2010, compared to 350 salmon caught in 2009. With rod exploitation rate unlikely to have varied greatly and with 67% of those caught being released, good numbers of salmon should have been found on the spawning grounds. This is reflected in the River Exe, meeting not just its conservation limit for egg deposition in both years, but both actually meeting the higher management target (which is closer to meeting the Exe Project Aim of Salmon Abundance). One may assume that this disparity in fry abundance between the two years is down to other factors effecting survival of the fry post emergence from the redds, with drought the most probable candidate.

2. INTRODUCTION

With Phase 3 of the River Exe Project having concluded at the end of June 2011, the Exe Project is set to continue with its aims and objectives, particularly those of attaining an abundant salmon population under its ten year action plan. Phase 3 of the River Exe project was funded by the River Exe and Tributaries Association, Exe Mitigation Group (Environment Agency, River Exe and Tributaries Association and South West Water), Exe Foundation, Exmoor National Park Authority & *Sustainable Development Fund* and the Westcountry Rivers Trust. Further funding of the wider aspects of the work has been enabled by European Funding from the WATER project.

3. METHOD

Electro-fishing methodology used as per other years, see previous reports.

3.1 Site Selection and Survey Objective 2011

The Environment Agency have annual sites on the River Exe and Tributaries, these are taken into account when planning the work. For the 2011 survey, the Little Exe and Quarne would remain a high priority to maintain the continuity of the longer term data set. Sampling of the other tributaries would also be undertaken to gain a catchment wide overview to help answer questions on access and spawning success on some of the more problematic underperforming tributaries, this would include the Pulham, Haddeo, Lowman and the Upper Culm.

In total 52 sites were sampled in 2011, including the Little Exe (15), Quarne (5), Haddeo and Pulham (10), Sherdon (6), Lowman (9) and Culm (7).

4. RESULTS

4.1 The Fry Index

Eight species of freshwater fish were recorded in the Upper Exe catchment during sampling including; bullhead, eel, lamprey, minnow, stone loach, grayling, salmon and trout. The results of the electro-fishing survey are classified according to the methodology of Crozier and Kennedy, as seen in table 1 below, with each site being given an equivalent density classification compared to quantitative monitoring. The results with the classification for each site can be seen in Table 2 in the appendix. The fry that escaped during electro-fishing were assigned to either trout or salmon groups depending on the percentage of each species already recorded at the site. Figure 1 found overleaf, provides a map with the density classification for each site for salmon fry for the Upper Exe and Tributaries.

Table 1. Semi-quantitative abundance categories and their relationship to quantitative electro-fishing densities (Crozier & Kennedy, 1994).

Density Classification	Semi-quantitative (n5min ⁻¹)	Quantitative equivalent (n100m ⁻²)
A (excellent)	>23	>114.7
B (good)	11-23	69.1-114.6
C (fair)	5-10	41.1-69.0
D (poor)	1-4	0.1-41.0
E (absent)	0	0

Salmon Fry Results

In 2011, the highest salmon fry abundance that occurred on the Little Exe was found from Silly Bridge u/s Exford down through spawning valley to Winsford. Excellent abundance was only found at 3 sites, namely Silly Bridge, Hantons and East Nethercote (compared to 11 sites in 2010). Overall the salmon abundance was fair/good but this was a big drop from the previous year. Excellent abundance was found at 18% of sites, 35 % sites showed Good abundance, 29% Fair abundance, 12% Poor and 6% absent.

From the rest of the whole survey across the L. Exe catchment, excellent abundance was unfortunately not found at any other sites. Overall the Quarme showed fair abundance. In the lower L. Exe, abundance was poor at Chilly Bridge on the Little Exe and through Hollam it was once again only fair. Despite the freezing start to winter, melting snow meant that water levels were reasonable. However, the cold water may have reduced the ability of the salmon to penetrate as easily through the system. The salmon fry production was indeed fairly poor in the top reaches of the Little Exe above Westermill farm, although it was better than the previous year at the top of the Quarme and into the Pulham.

On the lower tributaries, excellent abundance was only found on the Haddeo at two gravel washed sites at Gamekeepers. The lower Haddeo did perform well though, with good abundance being found at four other sites. This good abundance found in the lower Haddeo, unlike the rest of the catchment, has probably been aided by the compensation flow that the river received throughout the significant spring drought. Whilst the rest of the catchment was suffering, the Haddeo had excellent flows, which obviously aided survival of the fry by maintaining a good food supply and maximising the availability of habitat.

Overall though for the whole Haddeo and Pulham catchment, these good sites were outnumbered by the sites with poor and absent production, as found on the Pulham (poor) and Haddeo u/s Bury (absent). Although it should be noted that we did not have landowner permission to fish through the valley from Hartford to Bury, so the data presented here is only relying on one site instead of the usual dozen.

On the Culm and Lowman, as seen in Figure 1, most sites were absent of salmon fry. Indeed the bright spots on the Culm were the few sites with poor fry abundance, as seen at Culmstock and Uffculme.

Returning to the moor, our control reach, the Sherdon Water on the Barle once again performed well, with three sites with Excellent abundance. But even here there was a drop in abundance compared to 2010 with the overall numbers being lower.

Trout Fry Results

As also noted in previous years, the abundance of trout fry in the Little Exe in 2011 was generally poorer than salmon, overall being of generally fair/poor abundance as seen in Figure 2. As seen previously it was quite variable in the main stem, with the best abundance being the 3 fair sites upstream of Westermill, plus downstream of Exford at Hantons and Lyncombe. Although low in numbers, trout fry were recorded at all other sites except at Hele Bridge on the Little Exe which was better than in many of the previous survey years. Overall the results showed Fair abundance at 28%, Poor at 67% and absence of fry at 5% of sites. The trout fry abundance on the Quarme was also not as good as salmon being generally poor throughout this tributary, except in the more productive middle reach downstream of Luckwell Bridge.

For the trout in the rest of the Exe tributaries, spawning production was again good in the Pulham, which is easily the most productive part of the catchment for trout. In comparison the Haddeo was fair (upper) / poor (lower), the Sherdon was not as good as last year dropping back once more to poor abundance. The Lowman showed fair abundance in the upper reaches but rather absent in the lower. Finally the Culm again showed very similar results as in previous surveys, with sites with poor abundance of trout being equal in number to those that were absent, with only one site u/s Uffculme showing fair abundance.

Figure 1. 2011 Salmon Fry abundance results for the Exe and Tributaries.

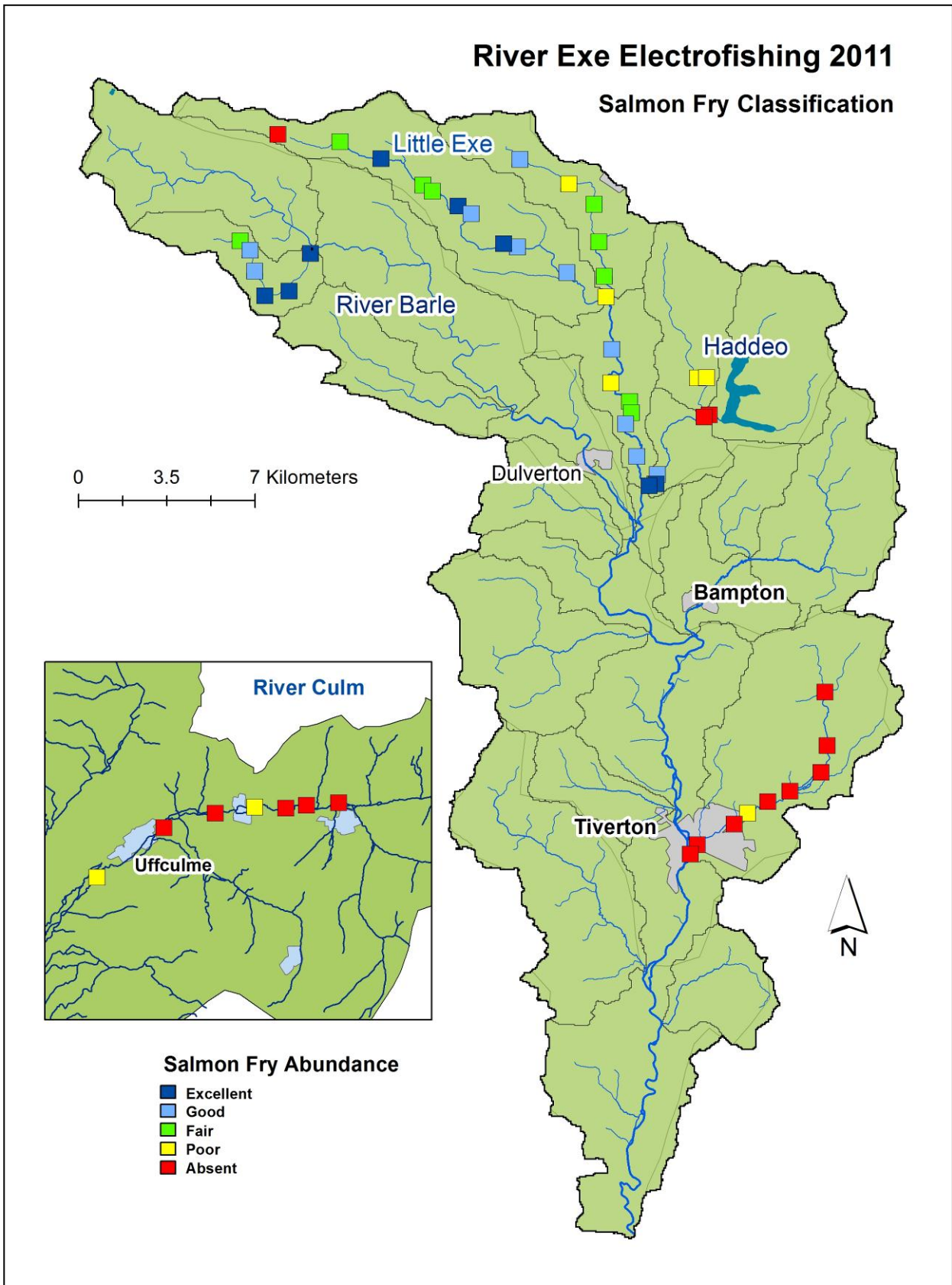
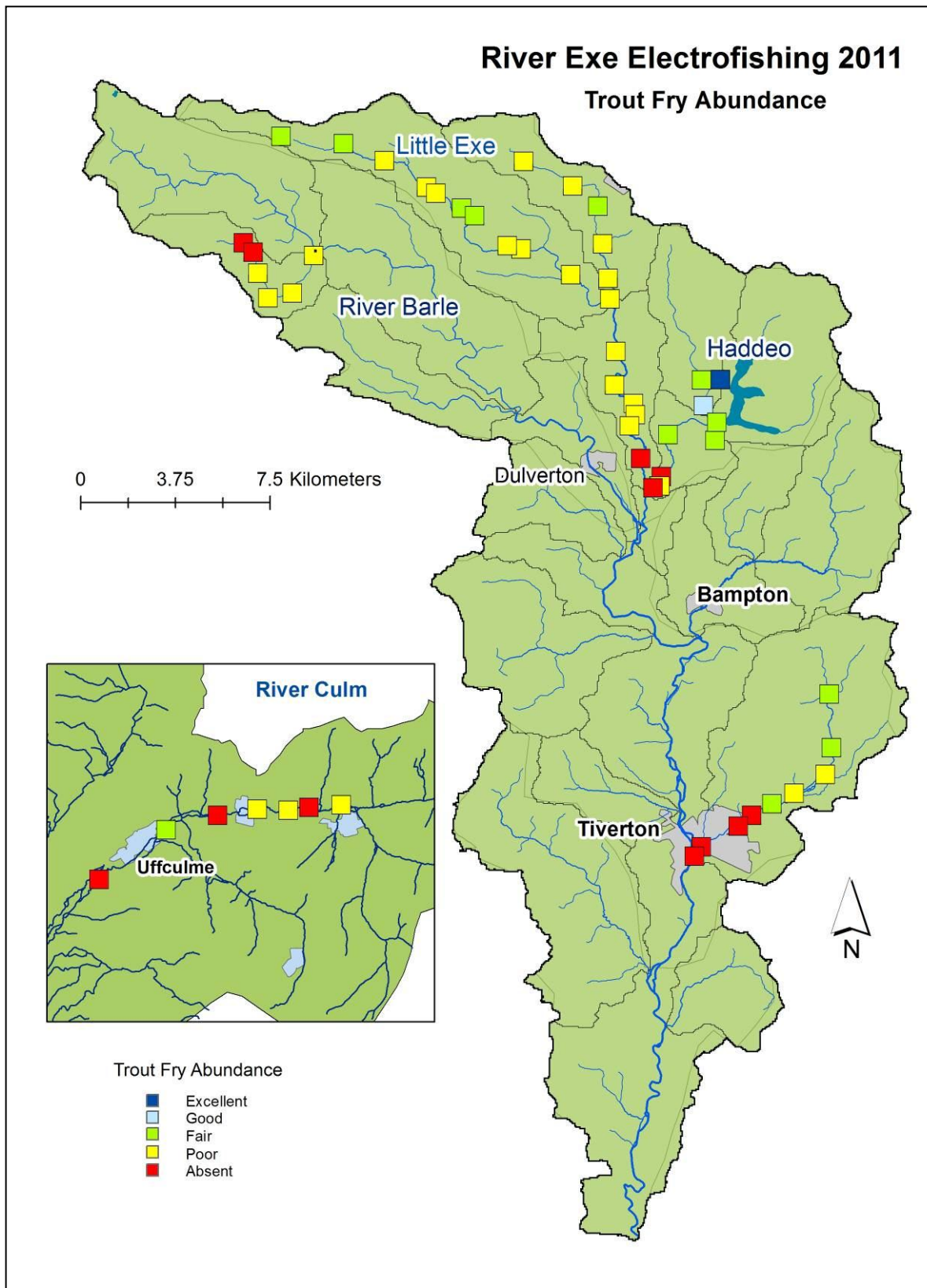


Figure 2. 2011 Trout Fry abundance results for the Exe and Tributaries.



Combined Salmonid Fry Results

As an overview of the Exe catchment, overall, salmonid fry (trout and salmon) were most abundant in the Little Exe, where 55% of sites had either excellent/good salmonid fry abundance (22% excellent, 33% good). This is a disappointing result compared to recent years of surveying. With the rest of the sites on the L. Exe being 39% fair abundance, 6% poor abundance. In comparison the Quarme had 33% good abundance, 50% fair abundance and 17% poor abundance.

The Pulham showed an improvement from last year when no salmon fry recorded. However, overall the good trout fry abundance once again carried the total salmonid fry abundance score with 33% excellent and 67% good. In contrast the Haddeo was 20% excellent, 40% good and 40% fair abundance (Unfortunately this result does not represent the whole river as access to electro-fish between Hartford and Bury was not granted this year).

In the wider Exe catchment, the lower altitude rivers had a lower abundance of salmonids; probably due to the higher agricultural intensification in these areas and the resulting poorer water quality, with diffuse silt and organic pollution the most likely background problem. However, the particularly dry spring conditions may also have had a more significant effect here than in the upland areas. The Lowman produced very poor results, with the overall salmonid abundance at the sites being 33.3% Fair, 33.3% Poor and 33.3% showing an absence of fry. With a lack of spates to clean through the system, heavy silt loadings on the bed of Lowman were very apparent and this may have been a factor contributing to the significant loss of macrophytes. Like the Lowman the Upper Culm also showed poor results, due to low salmon numbers but also the difficulty in finding sites where the trout spawning is productive. Here there were no sites with excellent or good fry abundance. The rest were 17% fair, 66% poor and 17% of sites were absent of any salmonid fry.

Finally a return to the moor, a look at our control reach, the Sherdon Water on the Barle showed 50% of sites had Excellent abundance, 33% Good abundance and 17% Fair abundance. However, even here there was a slight decrease in abundance, once again the trout abundance doing little to boost the results overall, which can clearly be seen in Figure 3 overleaf.

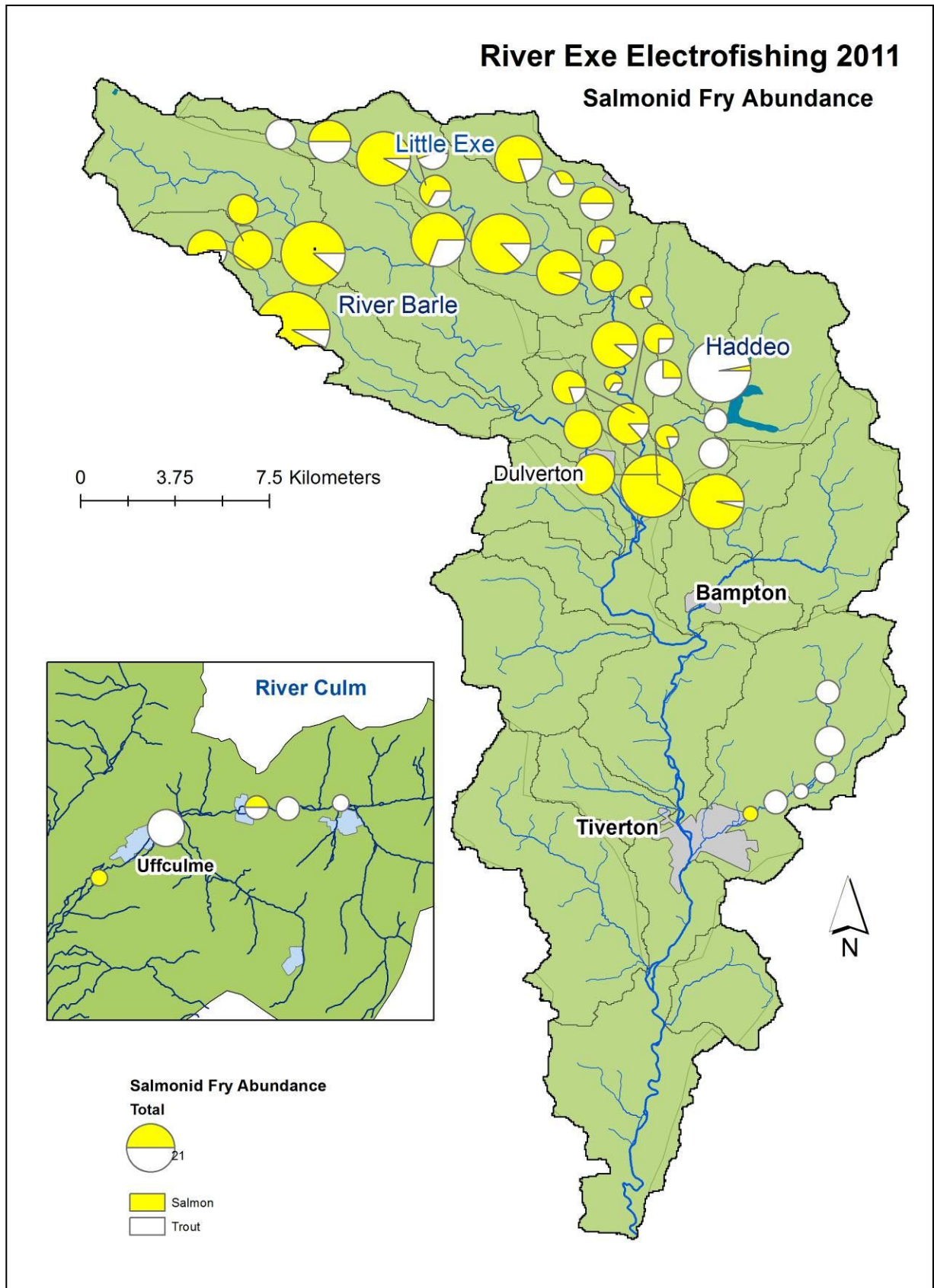


Figure 3. 2011 Combined salmon and trout fry results for the Exe and Tributaries.

4.3 Overview of the Exe Catchment for Salmon Fry Abundance

The 2011 salmon fry abundance results unfortunately do not maintain the improvement seen in recent years, with many areas dropping by a classification. Overall the results are more similar to those seen in 2006. In 2011, only the Pulham showed marginal improvement.

Sherdon (Excellent (A+))

The Little Exe achieves a Good rating from Silly Bridge to Miltons (Good (B)).

Haddeo Lower d/s Bury (Good (B)) >

Quarme (Fair (C)) >

Lower Little Exe (Fair (C)) >

Pulham (Poor (D)) >

Lowman (Poor/Absent (E/F)) >

Culm (Poor/Absent (E/F)) >

Haddeo Upper u/s Bury (Absent (F))

4.4 Abundance and Distribution of salmon fry L. Exe

Over several years, 2009 and 2010 saw fairly late salmon and in particular the grilse as reported by fishermen, with fish arriving in good numbers throughout October. This probably should also be borne in mind as well as flows when looking in further detail at the distribution of spawning salmon. Spawning production is also dependent upon the conditions that the eggs and fry endure during the period up to electrofishing. The fry abundance in 2011 has obviously been affected by the spring drought, with results in the Haddeo holding up far better than the rest of the catchment with the obvious benefit of the compensation flows.

For future years results some anecdotal observations are worth noting, even if they can't be fully quantified. Of note during the 2011 fishing season, was the improved number of salmon. The grilse run was also stronger during the actual fishing season, even if they were running very quickly to the headwaters. However, as in previous years, salmon were still arriving in reasonable numbers late into the season, as seen ascending the Exeter weirs when out with the EA on the 18th November, so it will be interesting to see how the future 2012 results will compare.

The average number of salmon fry caught at all sites on the Little Exe and Quarne is seen in Figure 4. Although not statistically significant, it looked as if an improving trend in fry numbers was emerging on the river, particularly with good fry abundance seen in 2010. However, although the egg deposition target should in theory have been met with the 2010 adult run and winter spawning. It certainly appears that the good fry numbers that might have been expected have not materialised this year.

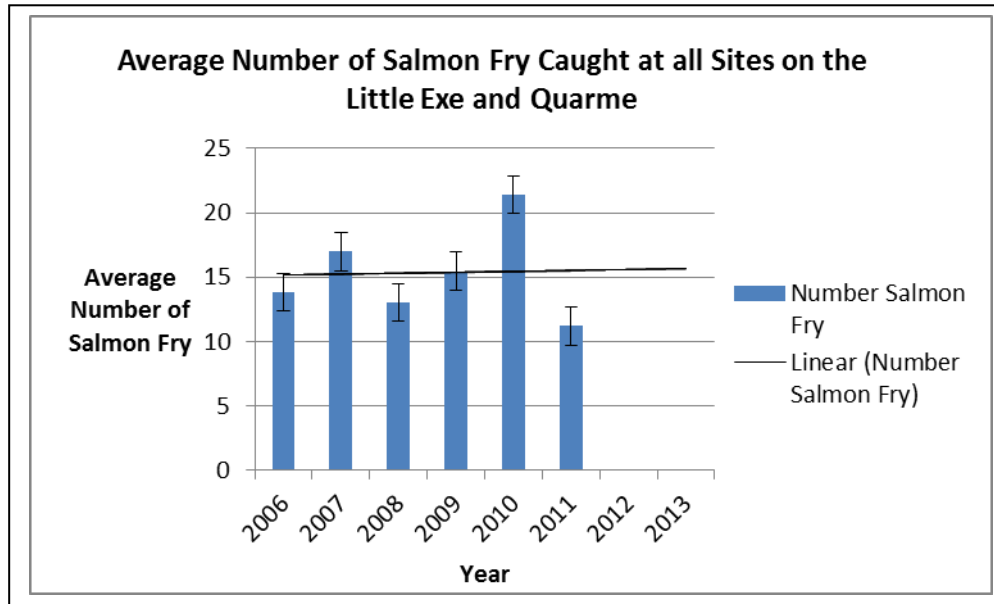


Figure 4. Graph showing the average number of salmon caught at all sites on the Little Exe and Quarne over all survey years 2006-2011.

2006: 13.80, **2007:** 16.97, **2008:** 13.04, **2009:** 15.47, **2010:** 21.38, **2011:** 11.18

The project has never set a target for salmon fry abundance that it would like to achieve through its river restoration activities. It has always looked at the survival at the parr stage as its target. The target for the Little Exe is to achieve an average of 12 parr per 100 m² by 2018. Spring drought aside this target parr level may well have been achieved in 2011 for most sites with the good level of fry abundance in 2010.

A quick review of the smaller number of annual Environment Agency sample sites from the previous survey in 2010 showed that the average (1+) parr density from the seven sites in the L. Exe and Quarne in 2010 showed an average score of 8.45 per 100m². Whilst the Haddeo showed an extraordinary average (1+) parr density of 12.48 per 100m².

With the excellent/good fry numbers seen in 2010, it was hoped that they would have translated through to good parr numbers for summer 2011. Unfortunately, as well as reduced fry numbers in 2011, 2010's good fry figures do not seem to have been maintained through to the parr stage either. Although due to the cut in the number of EA electrofishing sites undertaken on an annual basis it is slightly harder to assess with as much confidence, as there are only three sites on the L. Exe and Quarne to review. However, the average (1+) parr density at these sites was found to be lower than expected at only 6.27 per 100m². On the Haddeo the average (1+) parr density was also reduced at 9.4 per 100 m². (Both results are a Grade C).

The number of salmon fry caught at each site on the L.Exe in the 5 minute semi-quantitative surveys in 2011 can be seen in figure 5 compared to 2008 results, and in Figure 6 compared to 2006 results. The data are displayed as they are the three poorest years for salmon fry abundance that have been recorded. The salmon fry abundance in 2008 was concerning, in that unless there was good survival from fry to parr the resulting smolt output from the Little Exe would be low and have obvious ramifications for the future. As it turned out survival was good with 2009 results showing reasonable parr data.

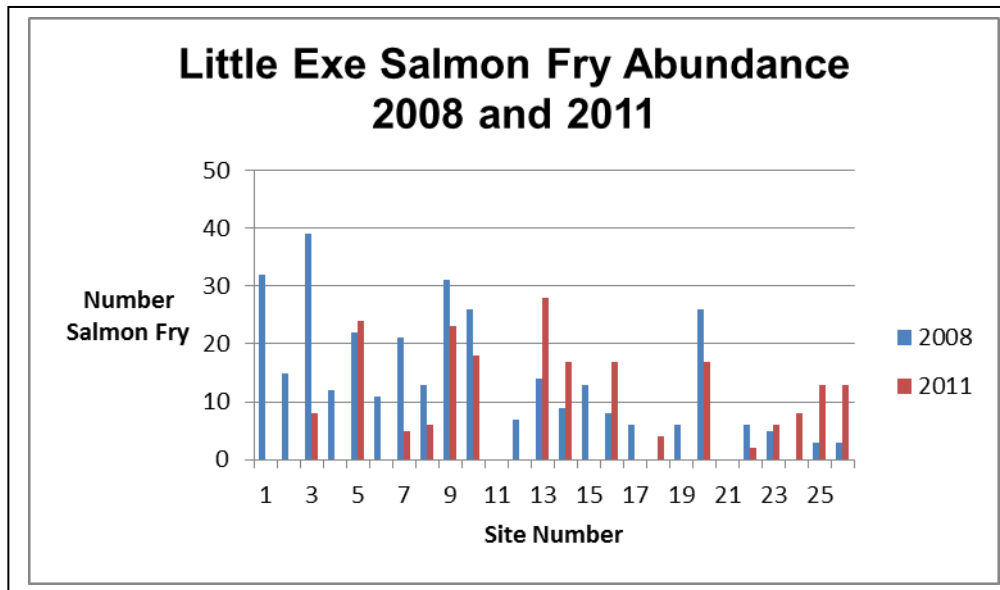


Figure 5. Salmon Fry Abundance on the L. Exe 2008 & 2011.

The 2011 fry abundance is overall fair/good for the Little Exe, with the Quarme, fair. As in 2008 I put the same caveat that good survival overwinter is required for reasonable parr numbers to be obtained in 2012. The most obvious difference between 2008 and 2011 though is that in 2008 the upper river performed well, whereas in 2011, the upper river did not perform as well, whereas further downstream, spawning valley at Winsford and the lower river were slightly better. The data displayed in the graph starts from site 1 at Warren Bridge.

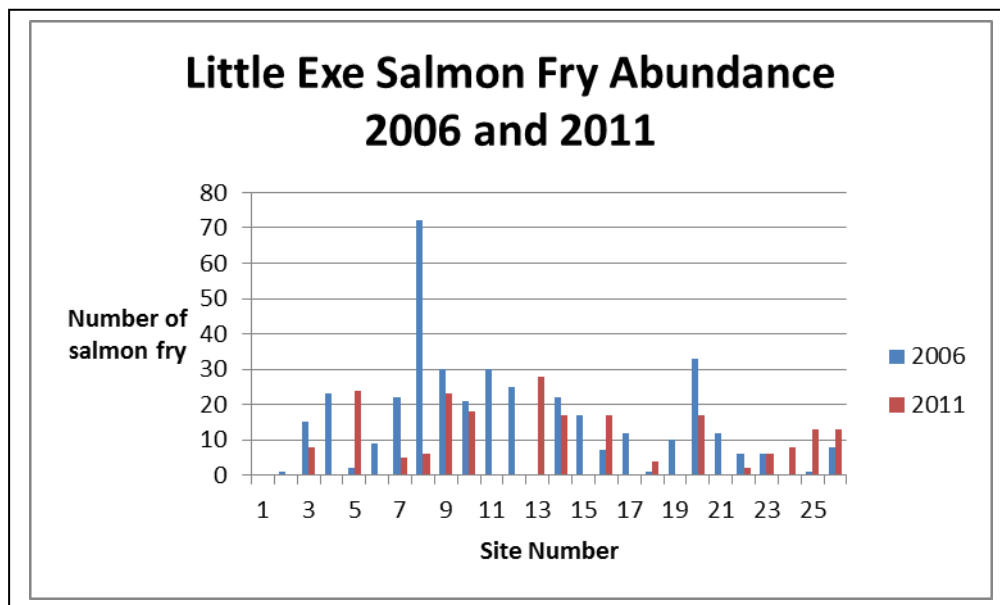


Figure 6. Salmon Fry Abundance on the Little Exe 2006 & 2011.

Several sites show a considerable variation between years, particularly in the upper reaches of the Little Exe, the most notable being site 8 at Exford. The upper sites above Westermill have also varied from excellent in 2008 to absent in 2006 and 2011.

2006 results were probably linked to the low flows hampering access to the upper spawning grounds. However, last year I wondered if there were other factors apart from flow which determine how far up the river the fish migrate, was run-timing a factor, particularly if the grilse were running late in the year. In autumn 2010, the flows were reasonable, although the conditions did turn rather arctic in late November. Cold water temperature may well have reduced the ability for some fish to navigate difficult weirs.

This is a possible question for the geneticists to look at, to see if they can identify whether there are different groups of fish running to different parts of the river (early running, late running, grilse, MSW). For example, grilse populations have been performing poorly in recent years, running late and in some years in poor condition, could this also be a factor in the poorer results seen above Exford (and Simonsbath) in recent years? On the Barle, in early November 2011, the fish were very spread out in the upper river and difficult to locate (pers com N.Maye). Yet from the Barle fishermen we know that with good running conditions the grilse run seemed to push up the river quite well in the late autumn but were not seen on the spawning redds in any numbers until early December. Over on the Little Exe, the salmon pushed up the river fairly well in late October/early November and had started spawning by late November. For the salmon that arrived in late in November, how far up river they pushed is hard to say, perhaps these late running fish spawn in tributaries further down river or even in the main stem.

5. DISCUSSION & RECOMMENDATIONS

What to take from the disappointment of the 2011 results. It would seem that if the rod catch is at all indicative of the strength of the run, then the reasonable figure of 404 salmon caught in the 2010 season should have translated to good fry numbers. If you look broadly at the results they appear to be only half as good as the previous year. The question is, did the drought conditions experienced during spring 2011 reduce survival or were there only half as many salmon spawning? Under normal conditions mortality is known to be extremely high in the first year of life, as competition for habitat in any year class will be strong. However, low river levels will mean that there is not as much physical habitat available for the fish. Under the dry conditions experienced, which lasted until late June, there was probably only half the usual habitat, as well as greatly reduced food supplies available. Therefore a high mortality of fry will have occurred.

Unfortunately, the same also seems to have been true for the parr survival. On the Little Exe, excellent fry numbers at Hantons and Kemps in 2010 have only translated to fair parr numbers (Grade C). Whilst on the Barle, Simonsbath managed to produce excellent parr numbers from excellent fry numbers the previous year. But the Bale water was not so productive, with excellent fry numbers last year only producing poor parr results (Grade D).

Obviously there is always some variation between years and also between sites with some being more productive than others. Also as seen, the spawning fish do not seem to spread evenly through the system. The question had been asked in previous years, how many salmon/redds are required to produce an Excellent abundance of fry? The answer would appear to be more than one pair/redd. From just looking at a redd it is rather hard to know how many ova are in it, it does depend on the size of the fish and how many eggs are released.

Fry are known to move up to 50 metres upstream of a redd and up to one kilometre downstream. Redd counting on the Haddeo in December 2010 revealed several sites with spawning activity. Electrofishing both up and downstream from these revealed some interesting results. Electrofishing the riffle 5m downstream of the redd at Road Corner showed good fry abundance, as was also the case for the second redd site further upstream at Old Oak. Fishing just 10m upstream of the redd at Road Corner also produced a good result with 12 fry. In comparison, the lowest site on the Haddeo at Gamekeepers was noted to have three redds. Here, electrofishing the riffle directly downstream gave an excellent result with 26 fry recorded. So although far from conclusive it does show that some interesting comparisons can be made between areas for the abundance of fry found and the numbers of spawning salmon/redds that may be present.

This can be seen at Exford, where the result this year was very disappointing with only 6 fry recorded. In 2006 this site recorded 72 fry. Why such a variation? Was it that fish were absent on the usual spawning area directly upstream from this electrofishing site (The answer is probably yes, the fry recorded may well have dropped back from a redd further upstream, otherwise like the results on the Haddeo,

one may have expected a good result if a single redd was present). I must admit I had reasonable expectations before sampling, as this site has always been fairly productive in previous years, plus the previous December I had counted several redds just downstream at Exford Bridge, as seen in the photograph below, so I knew that fish had migrated to the Exford area to spawn, but of course I did not know the actual numbers present in the area. The electrofishing site is exactly 75 metres upstream from the redds seen in the photograph below. It is known that adult salmon will home very accurately to their natal stream to spawn. However, there may be some leeway in returning to the exact spawning area (Give or take a few kilometres depending on the conditions). Research by D. Hay on the Girnock Burn on the Dee system in Scotland has also shown that salmon may pair up with several different fish and cut several different redds, they do not always cut just one redd with one other fish. Obviously it is also best if the fish do spread out rather than overcutting the best spawning site in a given river reach, as this will maximise the productivity of the population. However, there is no doubt that the best spawning locations do get overcut, the extent of which will depend on the size of the spawning population, the run timing and the migration flows in any given year.



Photograph of redds just upstream of Exford Bridge with a dead grilse in the top right taken December 2010.

Spawning Observations from the Exe Catchment (Barle and Haddeo).

Whilst out on the Barle during the first week of December 2011 Andy Coyne made some very interesting observations, as well as taking some excellent photographs.

“I was out on the top end of the Barle on Sunday and again today. There are good numbers spawning in all the usual spots. Simons Pool, Wheal Eliza and the pool by the fir trees downstream of Cornham Ford have all had four or five pairs on them. Some of the best views of the action can be had off Withypool and Landacre Bridges! There are some good fish on the upstream side of Withypool Bridge, they are probably on the tail of the bridge pool too but the water is just too big to see anything there. There still seem to be a fair number of fish running, I spotted a fair few lying in odd spots where they never spawn so I guess they were just resting on their way up. So it might still be worth a look this coming weekend. I tried to get some worthwhile spawning photo's but lack of sun and a wind ruffled surface defeated me yet again. I've attached the best one I got. I doubt you will ever get a very good photo of a redd off the Barle or Exe because the gravel is so clean that the redds never stand out in pictures. It doesn't help that the gravel is all flat as well, the redds are very shallow compared to those we see on the Axe or Frome.”



Photograph taken by Andy Coyne of a Barle salmon at the spawning redds.

It just so happens that I had a look over Withypool Bridge, the previous week to this, on the 29th November 2011 and noted two redds just upstream of the bridge. If other redds were added to these on that following weekend, provided there was not overcutting (unfortunately I did not get a chance to go back with suitable water height to find out) it may be that excellent fry abundance can be predicted to be found downstream of these redds in summer 2012. As we already know from the Haddeo having 3 redds or more may well lead to an excellent abundance score.

Having had a further conversation with Andy Coyne, he comments that the spawning salmon that he has generally observed on the Barle, particularly up at Simonsbath, tend to be grilse, whilst the fish he saw on this occasion at Withypool were better sized salmon of 8-10lb and were located by a large redd; in total there were six redds at Withypool, which is four more than I had seen the previous week).

Following up on Andy's observations, I had a conversation with Jo Down regarding her observations of spawning activity at Landacre Bridge. Several fish were observed during the first few weeks of December, seemingly this activity was a similar level to that seen at Withypool, in total there were five redds noted by the middle of December and these were all seemingly cut by grilse in the 5lb range.

In the context of the health of the River Exe salmon population, these interesting observations from the Barle do highlight the issue of the current level of electrofishing monitoring on the river. In recent years, the Environment Agency has dropped a number of sites on the main stem of the river Barle from the list of survey sites (whilst Withypool may only be fished once every 5 years or so). Without annual fishing of sites on the main stem of the Barle it certainly makes it much harder to find out just how productive a site like this is from this observed spawning activity.

At this stage one can only make a general guess. The river Barle is much wider here than other sites where observations have been made linked to the electro-fishing, such as the Haddeo. Just a comparison of the actual physical size of the river is worth noting, particularly when assessing its relative productiveness. It is known from Beall and Marty (1987), that a pair of spawning salmon require 10 square metres of river.

The most cut spawning area on the lower Haddeo was noted to have 3 redds. The river here is only about 8 metres wide and the actual spawning area is about five metres by six metres, so the river here is actually at full capacity. In comparison the spawning areas at Withypool and Landacre are much larger and can therefore hold many more fish, as the average width of the river at these sites is twenty metres. With 150 square metres of gravels available for spawning, these sites could therefore take up to fifteen pairs of spawning fish. So the current observations of five or six redds, although twice as many as the lower Haddeo, could actually be rather low. Certainly discussions with the Down family, indicate that there are fewer fish at this site than in the past, particularly compared to the good years in the late 1980's and early 1990's, when they remember seeing approximately three times as many fish on the redds.



Photograph taken by Andy Coyne of salmon spawning on the River Barle

It is worth noting that as salmon spawn down the entire length of the Barle, annual monitoring of this productivity on the main stem near its mid-point would be beneficial for long-term monitoring (not just the very upper reaches at Simonsbath). The Exe Project can but ask to get the historic survey sites re-instated, as my personal view is that the number of survey sites on the main stem of the Barle is now insufficient, and classic sites like Withypool, could be rather important. If this is not possible an alternative would be that the Exe Project could look at ways of covering some of this area with semi-quantitative surveys.

The following section briefly details how, using the electro-fishing density classifications, it is possible to assign differing levels of intervention and in turn suggest possible actions required for the Exe catchment.

Levels of Management Intervention

(A) Excellent and (B) Good fish abundance – Low Intervention

These areas are functioning well and therefore actions should be largely based on *protecting* habitat. This would include using fencing projects to maintain healthy riparian buffers, prevention of the removal of gravel and also farm advisory visits to ensure best farming practice is undertaken. Given the data, traditional fisheries management would place emphasis on ‘known’ techniques to improve fry to parr survival rates.

(C) Fair fish abundance – Medium Intervention

These areas indicate where there are limiting factors to salmonid production. The focus should be on *restoring* habitat and works are likely to have quick and significant results to populations. This could include activities such as fencing along with coppicing bankside trees to create a better shading regime. It may also include measures such as gravel rehabilitation or reintroduction of gravels extracted for flood defence purposes. Again gross habitat availability locally and therefore low recruitment to a life stage should not be overlooked as a cause of low habitat occupancy.

(D) Poor fish abundance – Medium / High Intervention

Again, these areas indicate where there are limiting factors and it is essential to investigate the underlying problem(s). Work should be targeted at *restoring* habitat although more aggressive techniques to *enhance* habitat through re-engineering or through supportive stocking which would be justified in these areas.

5.1 River Exe Catchment Salmon Abundance Classification

(A) Barle and Tributaries (Excellent)

Management Objective – Protect



Photograph August 2011.
A prime section of the Barle SSSI at Withypool, heavily infested with invasive species, particularly Himalayan Balsam and Japanese Knotweed. As this is a very important spawning/juvenile area it should be given high priority for restoration works by NE, ENPA, EA through the knotweed project.



Photograph August 2009. U/s Landacre Bridge, R. Barle.
This was the last large area to be brought into HLS in 2011. Let's hope that HLS can continue to fund the protection of whole Barle valley (with payment for extensive grazing) long into the future to keep it in good condition.

It is important that farms continue to gain access to the Higher Level Scheme to ensure that the right level of stocking rates and grazing pressure are maintained (along with stock control structures). Target area with HLS and continue with fencing, coppicing and introduction of woody debris.

Upper Little Exe: Silly Bridge u/s Exford down to Miltons (Good)

Management Objective – Protect



Photograph of selective coppicing at Winsford being undertaken in November 2011 prior to fencing works contracted to be undertaken in spring 2012.

Maintain the project improvements to help protect this very important area of the upper Little Exe with continued action of the introduction of woody debris, coppicing and fencing where required.



Photograph of works being undertaken in September 2011 to help protect the salmon population against climate change and lower flows.

These improvements to fish passage at Bridgetown Weir have the aim of ensuring improved passage to the best spawning areas in the Upper Little Exe.

**Lower Little Exe: Downstream Chilly Bridge (Fair)
Management Objective – Protect and Restore**

Maintain improvements with further coppicing, fencing and introduction of woody debris.



Photographs of Stockham/Hollam.

Extensive cutting and laying of hazel was undertaken in spring 2011, this was followed up in November 2011 with the last main section being fenced off to complete this one kilometre of restoration works.

Photograph below of woody debris introduction at Hollam and the excellent cover provided by laying the hazel coppice.



(C) Quarme (Fair)

Management Objective – Protect/Restore

As above, continue with fencing, coppicing and introduction of woody material. Target HLS to the Quarme. Water quality generally good but vigilance needed. Tackle localised issues in the middle section of river downstream from Luckwell Bridge. Review potential for further wet-woodland in the mid to lower reaches.

(C) Haddeo (Fair/Poor)

Management Objective – Restore/Enhance

Results for the lower Haddeo were once again encouraging, with the compensation flows aiding survival in the spring. Unfortunately the summer gravel restoration efforts on the main middle section between Bury and Hartford were set back due to lack of permission. However, in early 2011 coppicing works were undertaken on sections both up and downstream of Bury and 3,000 fry were also stocked. Further supportive stocking was undertaken at the end of the summer around Hartford (approximately 3000 fry). Review the situation for the main section of the Haddeo between Hartford and Bury as gravel introduction is still a high priority for future.



(E) Pulham (Poor)

Management Objective – Restore/Enhance



Key areas downstream from Bromton Regis were coppiced and fenced in the spring and autumn of 2011.

Access is obviously very flow dependent. Keep reviewing success of the fisheries water bank release.

Supportive stocking was undertaken in August 2011.

Again should be a target for HLS.

(E) Lowman (Poor)

Management Objective – Restore/Enhance

Possibly one of the worst results from the 2011 survey. Fry abundance very low for salmon and fairly poor for trout. The effects of low flows and siltation are far more apparent on the lowland streams. Continue working with landowners to reduce run-off and undertake further restoration works. Look at further options for the introduction of woody debris, to help narrow channels and protect banks from erosion.

Supportive stocking downstream of Huntsham was once again undertaken with approximately 3,000 fry released in the autumn.

(E/F) Culm (Poor/Absent)

Management Objective: Restore/Enhance

As expected salmon fry numbers are low. These should be improving in future years as further fish passage improvements are undertaken on the weirs in the upper system. Undertake habitat improvement with coppicing, introduction of woody debris and fencing.

Supportive stocking undertaken from Hemyock to Culmstock in August 2011. Coppicing, woody debris introduction and fencing works contracted for spring 2012.

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APPENDIX	TABLE 2											
2011	Site	Salmon fry	Classification	Salmon parr	Classification	Trout fry	Classification	Trout parr	Classification	Overall Salmonid Fry	Total salmonid fry numbers	
Little Exe	Exehead (EA)	0	ABSENT	0	ABSENT	15.94	FAIR (C)	8.7	FAIR (C)	FAIR (C)		
	Trout Hill	Ns										
	Warren Bridge	0	ABSENT	1		8	FAIR	1		FAIR		8
	Long Barrow	Ns										
	Orchard Bottom	8	FAIR	1		8	FAIR	6		GOOD		16
	Westermill (EA)	Ns										
	Silly Bridge	24	EXCELLENT	1		2	POOR	0		EXCELLENT		26
	Downscombe	Ns										
	Edgcott	5	FAIR	1		4	POOR	0		FAIR		9
	Exford	6	FAIR	0		3	POOR	0		FAIR		9
	Hantons (EA)	121.52	EXCELLENT(A)	6.74	FAIR (C)	8.64	FAIR (C)	3.58	POOR (D)	EXCELLENT(A)		
	Lyncombe	18	GOOD	4		8	FAIR	3		EXCELLENT		26
	Road Hill	Ns										
	Nethercote Bridge(EA)	Ns										
	East Nethercote Ford	28	EXCELLENT	2		4	POOR	1		EXCELLENT		32
	Kemps (EA)	65.3	GOOD (B)	7.96	FAIR (C)	2.92	POOR (E)	4.51	POOR (D)	GOOD (B)		
	Larcombe Foot (EA)	Ns										
	Vicarage	17	GOOD	1		1	POOR	1		GOOD		18
	Edbrooke	Ns										
	Coppleham	4	POOR	0		1	POOR	1		FAIR		5
Bridgetown	Ns											
Miltons	17	GOOD	0		2	POOR	0		GOOD		19	
Kents	Ns											
Chilly Bridge	2	POOR	2		1	POOR	0		POOR		3	
Stockham	6	FAIR	1		1	POOR	0		FAIR		7	
Hollam us Footbridge	8	FAIR	1		2	POOR	0		FAIR		10	
Barylynch	13	GOOD	2		2	POOR	1		GOOD		15	
Hele Bridge	13	GOOD	0		0	ABSENT	0		GOOD		13	
Weir Bridge (EA)	Ns											
Quarmer	Codsend	16	GOOD	0		4	POOR	2		GOOD		20
	Hammets Cleave	Ns										16
	Luckwell Bridge	2	POOR	0		4	POOR	1		POOR		6
	Hoe Farm	5	FAIR	0		5	FAIR	0		FAIR		10
	Quarmer Bridge	5	FAIR	0		2	POOR	0		FAIR		7
	Witheridge (EA)	26.42	FAIR (C)	4.12	POOR (D)	12.35	FAIR (C)	26.76	EXCELLENT(A)	GOOD (B)		
	Widlake	9	FAIR	0		0	ABSENT	0		FAIR		9

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2011	Site	Salmon fry	Classification	Salmon parr	Classification	Trout fry	Classification	Trout parr	Classification	Overall Salmonid Fry	Total salmonid fry numbers
BARLE	Bale Water (EA)	17.33	POOR (D)	6.09	FAIR (C)	13.58	FAIR (C)	21.07	GOOD (B)		
Sherdon	Wintershead	8	FAIR	1		0	ABSENT	0		FAIR	8
	Horsen	14	GOOD	1		0	ABSENT	0		GOOD	14
	Horsen Hill	11	GOOD	3		3	POOR	1		GOOD	14
	Sherdon Ford	23	EXCELLENT	3		2	POOR	1		EXCELLENT	25
	Sherdon Bridge	48	EXCELLENT	3		4	POOR	2		EXCELLENT	52
	Fernyball	33	EXCELLENT	9		4	POOR	0		EXCELLENT	37
	Simonsbath (EA)	157.02	EXCELLENT(A)	44.99	EXCELLENT(A)	1.15	POOR (E)	14.61	GOOD (B)	EXCELLENT(A)	
Pulham	Ford (Wessex)	Ns									
	New Mill (Wessex)	Ns									
	Pulhams Mill	3	POOR	0		9	FAIR	3		GOOD	12
	Bryants	1	POOR	0		35	EXCELLENT	1		EXCELLENT	36
	Lady HarrietFord (EA)	3	POOR (E)	0	ABSENT	18.92	GOOD (B)	15.32	GOOD (B)	GOOD (B)	
Haddeo	D/s Dam	0	ABSENT	0		8	FAIR	2		FAIR	8
	D/s Junction Pulham	0	ABSENT	1		5	FAIR	1		FAIR	5
	Clammer Ford (EA)	0	ABSENT	4.71	FAIR (C)	10.79	FAIR (C)	11.78	FAIR (C)	FAIR (C)	
D/s Redd	Oak Tree	11	GOOD	1		0	ABSENT	0		GOOD	11
U/s Redd	Road Corner	12	GOOD	1		2	POOR	3		GOOD	14
D/s Redd		15	GOOD	0		0	ABSENT	0		GOOD	15
	U/s Bury Bridge (EA)	Ns									
	Pink Cottages (EA)	Ns									
	Top field gravel site	4	POOR	3		1	POOR	1	1	FAIR	5
	Top site Gamekeepers	26	EXCELLENT	1		1	POOR	1		EXCELLENT	27
D/s Redd	Lower site Gamekeepe	35	EXCELLENT	2		0	ABSENT	1		EXCELLENT	35
	Gamekeepers (EA)	65.81	GOOD (B)	14.08	GOOD (B)	1.28	POOR (E)	6.91	FAIR (C)	GOOD (B)	
Lowman	Huntsham hunting gate	Ns									
	Middle Hill	Ns									
Stocked	Huntsham Wood End	0	ABSENT	4		5	FAIR (C)	4		FAIR (C)	5
	Beer Down	Ns									
	D/s Stags Mill	0	ABSENT	0		8	FAIR	5		FAIR	8
	Chief Lowman House	0	ABSENT	1		4	POOR	5		POOR	4
	Rolliphants	0	ABSENT	0		2	POOR	7		POOR	2
	Craze Lowman	0	ABSENT	1		5	FAIR	5		FAIR	5
	Little Gornhay	2	POOR	2		0	ABSENT	4		POOR	2
	Blundells Ford	0	ABSENT	1		0	ABSENT	0		ABSENT	0
	Old Blundells	0	ABSENT	2		0	ABSENT	4		ABSENT	0
	Lowman Junction	0	ABSENT	2		0	ABSENT	0		ABSENT	0

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2011	Site	Salmon fry	Classification	Salmon parr	Classification	Trout fry	Classification	Trout parr	Classification	Overall Salmonid Fry	Total salmonid fry numbers
Culm	D/s Millhayes Bridge	0	ABSENT	0		1	POOR	1		POOR	1
	D/s Whitehall Weir	0	ABSENT	0		0	ABSENT	2		ABSENT	0
	Westown	0	ABSENT	0		2	POOR	2		POOR	2
	U/s Culmstock	1	POOR	1		1	POOR	1		POOR	2
	Woodhayne	0	ABSENT	0		0	ABSENT	1		ABSENT	0
	U/s Uffculme Weir	0	ABSENT	0		5	FAIR	3		FAIR	5
	Langlands	1	POOR	2		0	ABSENT	1		POOR	1
Salmon and Trout abundance (fish per 100 m2) associated with absolute classifications in the National Fisheries Classification Scheme (NRA 1994a). Grades run from A to F (e.g. grade A >86 and grade B 45-86 0+ salmon per 100 m2)											
Species group Class	A	B	C	D	E	F	Absent				
0+ Salmon Fry	>86	45 - 86	23 - 45	9 - 23	0 - 9		0				
>0+ Salmon Parr	>19	10 - 19	5 - 10	3 - 5	0 - 3		0				
0+ Trout Fry	>38	17 - 38	8 - 17	3 - 7	0 - 3		0				
>0+ Trout Parr	>21	12 - 21	5 - 11	2 - 5	0 - 2		0				
Key	5 min Semi-Quantitative Fry Abundance Classification after Crozier and Kennedy 1994										
Number Salmon	Classification										
>23	EXCELLENT										
(11 - 23)	GOOD										
(5 - 10)	FAIR										
(1 - 4)	POOR										
0	ABSENT										