Fisheries research report 2014

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MorFish
Monitoring for Migratory Fish

Game & Wildlife
CONSERVATION TRUST

Contents

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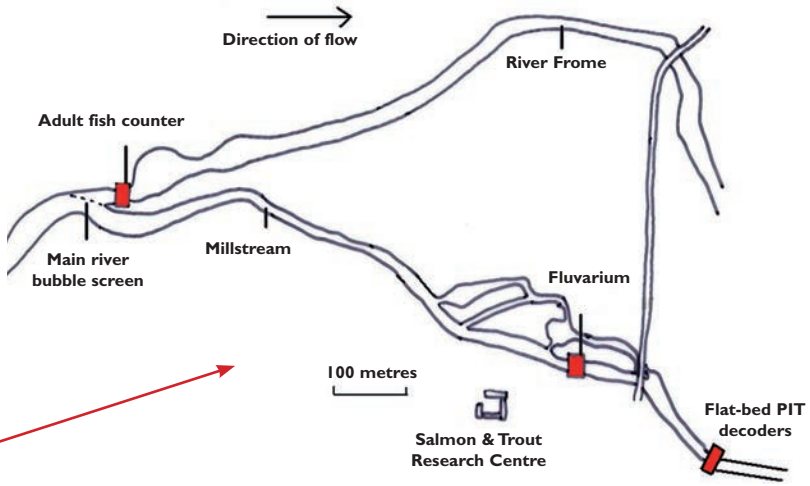
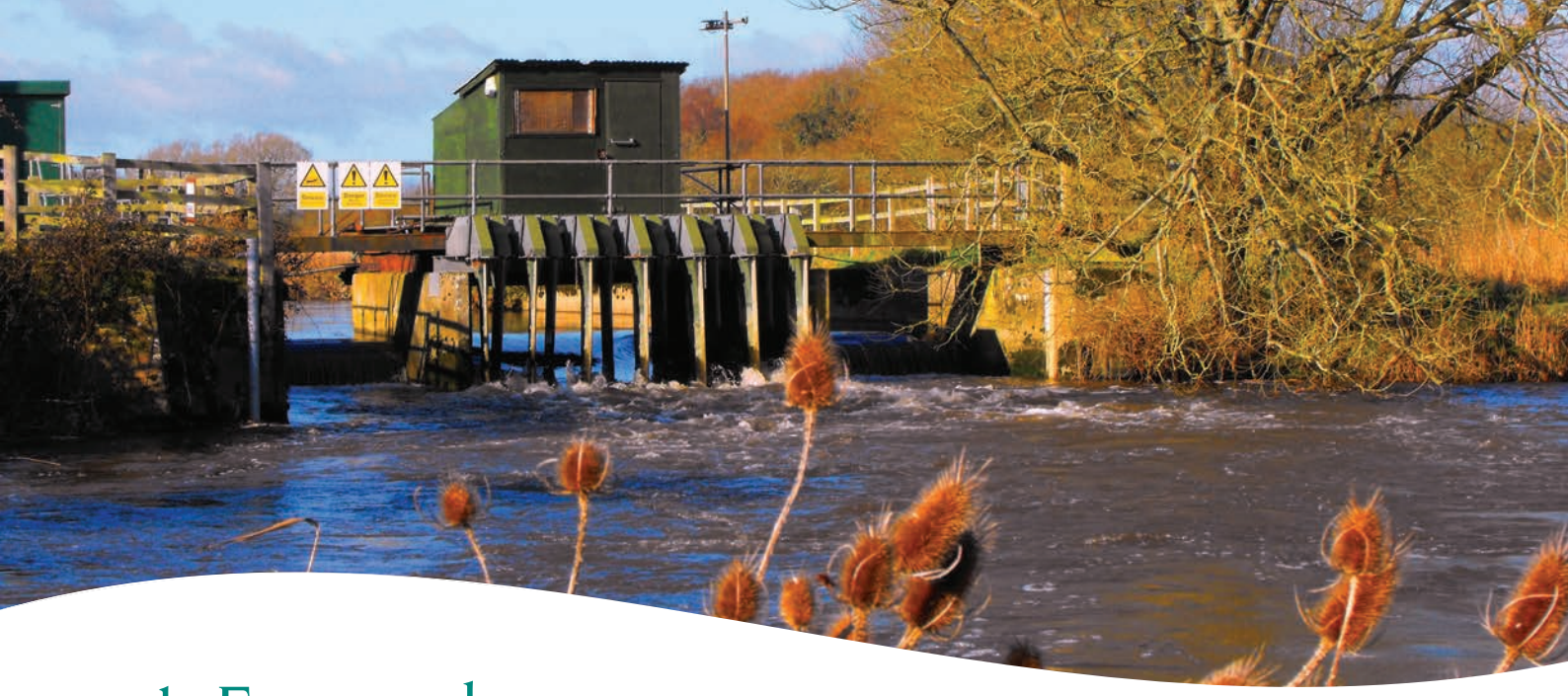
Front cover: Installing new PIT-tag readers. © GWCT.
Below: Lamprey sampling; electro-fishing off a boom boat; monitoring salmon on the River Scorff in France.



Left: The location of the Salmon & Trout Research Centre in Dorset
Above: Site plan of the counting equipment at the Salmon & Trout Research Centre at East Stoke



1. Foreword

David Mayhew: new Chairman of GWCT Fisheries Research Steering Committee

One of the leading lights in investment banking, David Mayhew, Vice Chairman of JPM Morgan and former Chairman of Cazenove and JPMorgan Cazenove has recently been appointed Chair of the Game & Wildlife Conservation Trust's (GWCT) Fisheries Research Steering Committee. He combines these duties with his role as Chairman of Alzheimer's Research UK and is a lifelong fisherman who part-owns the prestigious Islamouth fishing beat on the River Tay.

Why David Mayhew supports the Fisheries work of the Trust

"After catching my first trout at the age of 10, I was hooked and I've have been a passionate fisherman ever since. I get totally absorbed by fishing, it's done in beautiful places with wonderful unsurpassed scenery and the sport gives you a rare opportunity to appreciate this very special environment. Although I am not a scientist, I feel that having a better understanding of what makes a healthy river environment tick is hugely important and fascinating. It is an under-researched area and this needs to be improved to protect our rivers, streams and aquatic life.

I first came into contact with GWCT in 2009 when they took over the running of the salmon research on the River Frome. As a keen salmon fisherman I was very impressed that the GWCT had the foresight to take over this incredibly valuable research centre, which to date has accumulated more than 40 years of data on Atlantic salmon. No doubt without GWCT's intervention the work on salmon on the Frome would have ended.

Their research on the Frome is world class! They have facilities which are unsurpassed in Europe to monitor in detail and with great accuracy the total annual population of both migrating juvenile and adult salmon. Even more importantly they are developing the knowledge to better understand what makes salmon populations tick. If we understand what makes them fluctuate then we stand a better chance of stemming their decline.

Their work is recognised internationally. The information they collect feeds into an international network of "index" rivers which reports annually to the International Council for the Exploration of the Sea who advise governments on the current status and management of salmon stocks.

However, finding the £400,000 a year to continue the work is extremely challenging for a small charity which is why I am looking forward to becoming more involved in their research and supporting their challenging fundraising efforts. I would like to thank Clay Brendish and Anthony Daniell for their financial support of our Salmon and Trout Research Centre at East Stoke on the River Frome.

I urge you to support the Trust to enable them to continue their magnificent research. If you would like to see their work at first hand, they would be delighted to show you around their facilities. If you visit in the spring or autumn you are also likely to see a fish or two!"

Dylan Roberts, head of fisheries, with David Mayhew, new Chairman of our Fisheries Research Steering Committee.

2. Adults salmon estimate 2014

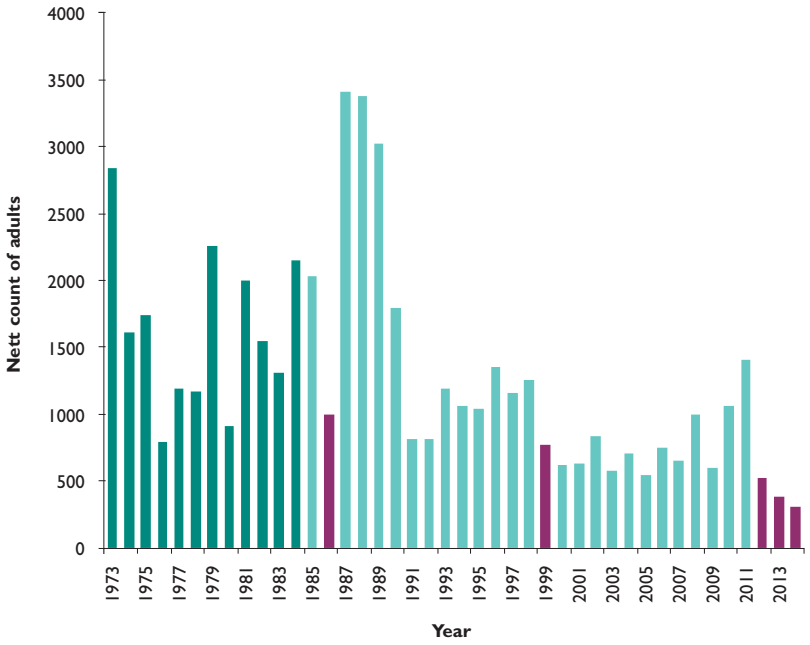
The fisheries group at East Stoke has monitored the Atlantic salmon population in the River Frome for more than 40 years, which makes it one of the longest continuously recorded salmon populations in the world. Since 1973, a resistivity counter on the Environment Agency gauging weir at East Stoke has been recording adult salmon returning to the Frome. The counter works by constantly measuring the electrical resistance of the water. When a fish of more than 50 cm passes over the electrodes the resistance changes and is registered on the counter.

The annual Salmon run data are presented for the period February to January inclusive. Past data indicate that the majority of the upstream movement in January is caused by fish migrating to spawn that winter, not fish migrating to spawn in 11 months time. A large part of the effort in running the East Stoke counter is focussed on verifying and matching the 'counts' from the monitoring equipment. The data are verified by a combination of trace waveform analysis, video frame-grab and videotape analysis.

Equipment failure is a constant issue with fish counters and 2014 at East Stoke was no exception as the underwater connection to one of the electrodes broke resulting in the counter not being fully operational for much of the year. The system was reconfigured to work with just two of the three electrodes and all likely fish movement was verified by the partial waveform trace and/or video verification. Due to these equipment issues rather than providing a count we have provided a minimum nett upstream count from the fish counter for 2014 of 196 fish (see Table 1). The numbers recorded on the fish counter in 2014 were very low (see Figure 1).

Figure 1

The long-term annual nett counts (with pre -1985 data being corrected for downstream counts). Note that the last three years data are minimum counts.



We are currently developing a statistical framework to improve how we deal with periods of equipment failure and to develop a method that provides a measure of the accuracy of the estimated daily counts. Developing this framework is part of the MorFish project (see page 10) and when completed we will apply this framework to both past and new data.

We can also obtain an estimate of the number of returning adult salmon from the detection of PIT-tagged adults. During the smolt run we quantify what proportion of the population that is tagged (see page 6). We can use the combination of the number of adult tags detected and the proportion of a particular cohort that was tagged to estimate the total number of adults. In 2014, a total of 25 PIT-tagged adults were detected and as 8% of the smolt population in both 2013 (returning as grilse in 2014) and 2012 (two sea winter adults in 2014) were tagged, 25 tagged individuals equates to 312 adults.

No PIT-tag detection system is 100% percent efficient so some tags will have been missed by the readers, hence the actual number of tagged adults will have been greater than 25. The installation of new PIT-tag systems at Bindon Mill and Nine Hatches (see pages 8 and 9) will facilitate calculating the efficiency of the PIT-tag systems enabling us to not only calculate the population size of returning adults but also provide a measure of accuracy of the population estimate.

Running the counter alongside the PIT-readers will enable us to compare and validate estimates. Furthermore, the video images from the fish counter make it possible for us to estimate the size of our PIT-tagged fish and other individuals enabling us to look at size structure of the population and calculating individual growth rate at sea.

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Table 1

The monthly numbers counted ascending or descending and the nett numbers ascending (i.e. upstream minus downstream). However, during January, February and March the downstream counts are not subtracted from the upstream counts as a high percentage are caused by downstream moving kelts (post-spawning salmon).

TABLE 1

Monthly counts of adults

	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	TOTAL
Gross upstream	0	2	4	5	7	46	6	0	87	35	16	7	215
Gross downstream	0	4	1	0	0	3	0	0	8	1	6	11	34
Gross upstream	0	2	3	5	7	43	6	0	79	34	10	7	196

3. Smolt run 2014

Our autumn tagging and spring smolt counting help us to estimate the total number of salmon parr in the autumn.

Cleaning the rotary screw trap.

Life-history partitioning

Like many other rivers around the North Atlantic, the numbers of salmon returning to spawn in the River Frome crashed in the early 1990s (see Figure 1). Because this crash was experienced in salmon populations throughout large parts of its distribution it was most likely caused by changes at sea. This event highlighted to our fisheries research group at East Stoke the importance of being able to separately analyse the changes effecting survival that occur in freshwater and those that occur at sea. Only by monitoring both smolt output (freshwater production) and returning adults (marine survival) are we able to separately analyse the two components of the salmon lifecycle. The number of returning adults has been quantified on the Frome since 1973, but only with the installation of full river coverage PIT-tag antennae 13 years ago has we been able to compare the size of the smolt output from the Frome.

Parr tagging

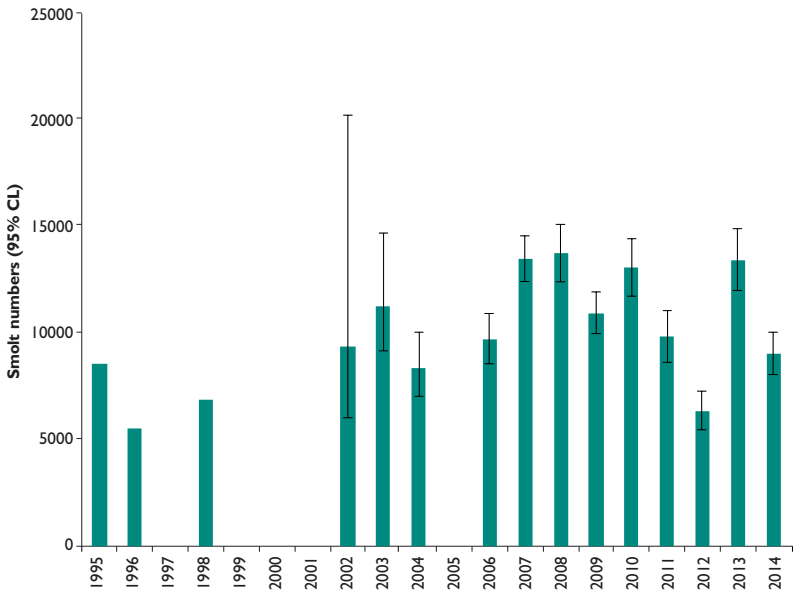
The PIT-tag antennae detect Passive Integrated Transponder tags. These small tags, measuring just 12 x 2 mm, (see image on facing page) are inserted into parr and the tag code is recorded when tagged individuals swim past the antennae. Since 2005, in September every year we have electric fished and tagged approximately 10,000 salmon parr (8-15% of the juvenile salmon population in the catchment). In 2014 we tagged just under 9,000 individuals, which is less than we would have liked but despite a concerted effort we were unable to catch the desired 10,000 parr.

The detection of PIT-tagged individuals when they swim past the antennae on their way to sea and when they return as adults enables us to determine the population size of smolts and adults. Furthermore, as the antennae record the identity of individuals, we are able compare survival of juvenile fish from different parts of the catchment and link this to factors such as density and habitat composition.

Smolt estimate

During the smolt migration period (April to mid-May) we use a device called a Bio-Acoustic Fish Fence (BAFF) to divert the fish into the Mill Stream at East Stoke. The BAFF is a curtain of bubbles that has sound entrained within the bubbles, thereby creating an audio-visual impression of a barrier diverting the fish. Like previous years, the efficiency of the BAFF was good in 2014, deflecting 70% of the smolts down the Mill Stream.

Figure 2
Annual smolt estimate and 95% confidence intervals.



Salmon parr and PIT tag (circled). Individual ID of the tag is shown on the label.

There are PIT-tag antennae in both the Mill Stream and the main channel so no matter which route the smolt use they will pass one of our detection devices. We divert smolts down the smaller Mill Stream for ease of capture with a rotary screw trap (see picture on the facing page). The detection of PIT-tags does not require "hands on" fish but we need to collect biological information (length, weight and scales) from a proportion of the smolts and establish the proportion of smolts that are tagged. In 2014 we caught 2,466 smolts in the trap and of these 310 (12%) were tagged. Using the number of tags detected, the ratio of tagged to non-tagged smolts and the efficiency of the PIT-tag antennae we can calculate that the smolt output in 2014 was 9,010 ± 996 (95% confidence interval). The smolt output in 2014 was below the average for the past nine years (11,020) (see Figure 2) which is probably linked to a low adult run in 2012 (see Figure 1).

Smolt run pattern

A major advantage of the PIT-tag detectors is that it is continuously running and linking the data to real time, meaning we now have a far more detailed insight into the patterns within the smolt migration window. Figure 3 shows the smolt migration pattern for 2014. This clearly illustrates that discharge affects the exact timing of the smolt migration.

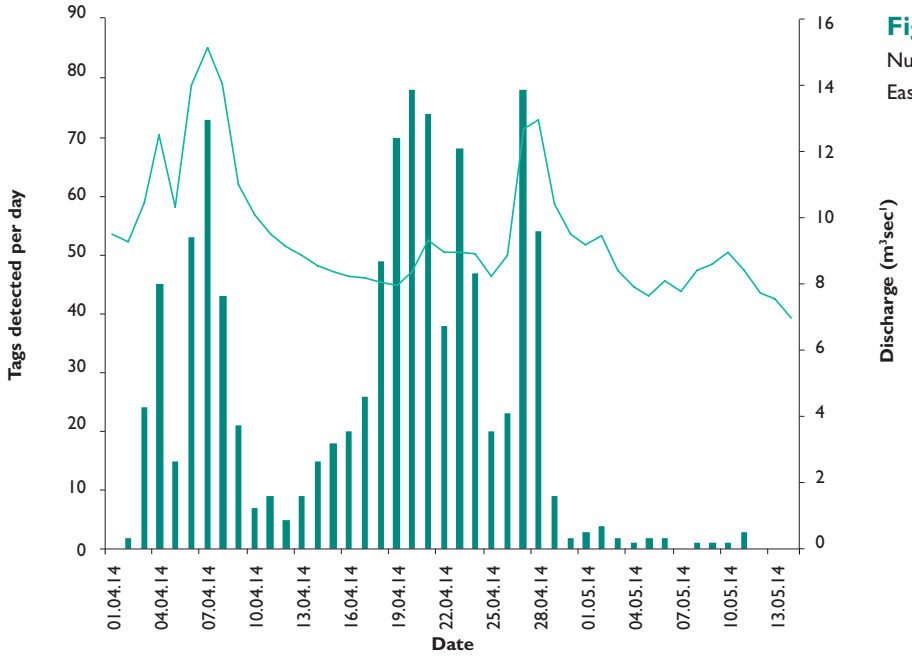


Figure 3
Number of smolt tags detected per day at East Stoke in relation to river discharge.

4. Installation of new PIT-tag systems

Installation of the new PIT-tag antennae required lots of man power and a few power tools.

The first in-river array of PIT-tag antennae at East Stoke was installed in 2002. The primary aim was to establish a robust method for assessing the output of salmon smolts from River Frome. This array has provided us with one of the most accurate methods of estimating smolt output in Europe but after 12 years in the river the array is now wearing out. With the financial support from GWCT sponsors and core funds as well as from our recent EU project, MorFish (see page 10), we were able to replace the old system with a new state of the art system. Not only were we able to replace the old system at East Stoke but we have also installed a full river coverage arrays at Nine Hatches, 21 km upstream of East Stoke.

The installation of the new systems took place during July 2014 in the middle of last summer's heatwave. Lots of work had gone into the preparation for the installation and 14 staff and helpers from seven different countries participated in the installation. The installation was a mammoth job and over 500 man hours were spent during the installation of the 22 antennae.

After installing the PIT-tag antennae there were a number of teething issues, primarily because these systems are very sensitive to electronic noise in their environment and the conditions at each location are unique. At the end of the winter these issues had to a large extend been ironed out and we are delighted to report that during the 2015 smolt run the systems at East Stoke were operating at an overall efficiency of more than 92% which is very impressive for a full river coverage array.

The new installation at East Stoke has secured us the ability to obtain an accurate measure of the smolt output from the River Frome for the foreseeable future. The new installation at Nine Hatches has opened up new avenues of research for us. In particular, the new array enable us to study transition time and migration speed of smolts and adults and we will be able to obtain a measure of in-river loss rate during the down-stream migration of smolts.

In particular, we would like to thank Anthony Daniell for his and Winton Capital's generous support in establishing our most up-stream full river array of PIT-tag antennae at Nine Hatches. The system at Nine Hatches will provide new and very interesting information about long distance in-river migration patterns of both adult and juvenile salmonids.

5. Bindon Mill Hydro-turbine

The recent drive towards renewable energies has caused a marked increase in applications for small scale hydropower schemes in the UK (ca. 5000 potential sites). These schemes often involve the construction of weirs to increase water head and the installation of generating hardware such as an Archimedes screw. Water passes through the screw which then rotates generating electricity. These schemes have caused concern within environmental organisations because of the potential damage to fish which may pass through the rotating turbine, in particular downstream migrating juvenile salmonids and adult eels.

In 2010, a low head hydropower plant (Archimedes screw design) was installed at Bindon Mill 3.5 km upstream of the East Stoke site, thus presenting an opportunity for evaluating the 'fish friendly' reputation of these structures, not just immediately after passage but also over longer time periods to see whether previously reported superficial damage to fish has any mortality or population effect later in their life-cycle.

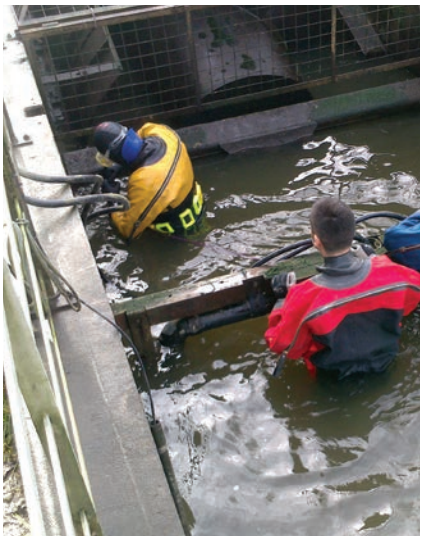
Previous studies into the impacts of these turbines have tended to focus on damage to fish immediately after they exit the turbine. However, there are concerns that sub-lethal damage (not always obvious immediately below the turbine) may result in a higher probability of mortality later on during migration through increased vulnerability to predators, changes in behaviour resulting in a longer time of migration and missing the optimum time of entry to saltwater, or a reduction in the ability to osmoregulate on entry to saltwater. The installation of the turbine within such a well monitored river provides a unique opportunity to assess its impact and so a partnership was formed between the GWCT and the Environment Agency with the following specific objectives:

(a) For downstream migrating juveniles, to compare mortality and transition time between those fish passing through the turbine to those fish migrating through other escape routes to East Stoke, before entry to salt water.

(b) To estimate the comparative mortality to adult stage of those smolts that migrated through the turbine with those that did not.

PIT-tag antennae were fitted in both turbine and escape channels at Bindon Mill. During the 2015 smolt run an encouraging number of tags were recorded from smolts using both the turbine and escape channels. These records will enable us to report on the hydro turbines effect on the loss rate and transition time between Bindon Mill and East Stoke (objective a).

These results will be reported to the Environment Agency later this year. In the years to come we will add to the data on short term effect on smolts and when the PIT-tagged salmon return as adults we will be able to report on survival to the adult stage (objective b).



The PIT-tag antennae monitoring down-stream migration of juveniles through the hydro turbine enables us to study the survival of individuals going through the turbine and compare with individuals using other routes around the turbine.

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The River Scorff in Brittany - one of several rivers monitored as part of the MorFish project

6. MorFish - an international project

MorFish is an EU Interreg-funded project with three objectives: (1) to collate and analyse long-term salmon datasets; (2) to harmonize the methods used to collect those data; and (3) to expand the salmon monitoring programmes to other migratory fish.

What does "MorFish" mean and who's involved?

It is an abbreviation for "Monitoring for Migratory Fish". It is a collaboration between the Game and Wildlife Conservation Trust (GWCT) and the Institut National de la Recherche Agronomique (INRA), a government-funded French research agency.

Why GWCT and INRA?

GWCT and INRA hold between 25 and 40 years of detailed data on salmon and other migratory fish on the rivers Frome in Dorset (UK) and the rivers Scorff and Oir in Brittany and Normandy (France). These rivers provide regional information on the status of migratory fish stocks. They also form part of a network of "Index Rivers" that report salmon data to the International Council for the Exploration of the Sea (ICES) who advise European governments on the current status and management of migratory fish stocks.

Why is MorFish important?

Salmon and other migratory species including sea trout, eel and lamprey need our help because their populations are threatened by the same factors threatening wildlife across the globe, namely habitat alteration, climate change, pollution and over-exploitation.

Ultimately, MorFish will contribute to the long-term conservation of wild salmon populations. MorFish will meet this challenge by breaking down barriers to international cooperation and knowledge sharing and delivering findings from large historical datasets.

What will the project deliver?

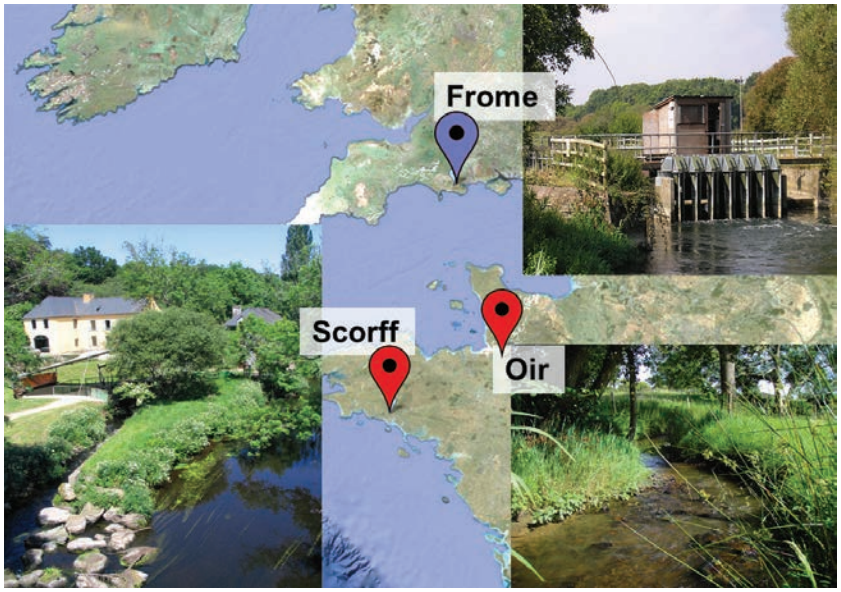
MorFish will deliver cooperation between France and England, cross-border sharing and exchange of knowledge on salmon monitoring, European demonstration sites for efficient salmon monitoring technology and improved statistical and practical monitoring methods.

MorFish will also deliver results on two research projects: (1) a study of changing salmon parr sizes in NW France and SW England; and (2) a method to estimate spawning salmon stock from validated automatic fish counters.

Environmental and biological drivers of changing salmon parr lengths

Changes in parr condition, notably length, could be responsible for recent decreases in the abundance of Atlantic salmon, either by reducing the number or timing of salmon migrating to sea or by affecting their survival at sea. Yet, few studies that have shown that changes in salmon parr lengths are correlated with environmental and biological factors.

Salmon parr have been monitored on the Frome, Oir and Scorff for 15-25 years. The length of every parr captured – of which there are many thousands – is measured. With these data, we are developing statistical models to describe parr length changes and determine whether they have been affected by river temperature, flow or numbers of competitors for food/habitat.



Estimating salmon stocks from automatic fish counters

Salmon stocks across the world are quantified using automatic fish counters. In principle, automatic fish counters quantify salmon stocks with little human intervention. In reality, the data must be validated to ensure salmon are being counted and data missing due to periods of malfunction must be accounted for statistically.

We are developing a framework to estimate consistent daily salmonid counts from noisy and incomplete automatic fish counter data. The framework accounts for incomplete validation, periods of malfunction and covariates of salmonid movement rates. It will be tested using synthetic data and then applied to 15 years of river Frome salmonid counter data. Once tested on the Frome data, the framework will be made available to salmon population managers and researchers worldwide.

The MorFish project demonstrates the importance of collaborative work, including the involvemet of the following organisations:

INRA SCIENCE & IMPACT

france (manche) england interreg

Game & Wildlife CONSERVATION TRUST

AGRO CAMPUS OUEST

Cefas

Waiting for smolts to be washed onto the eel rack.

7. Tracking estuarine migration of sea trout smolts

The migration behaviour of sea trout smolts when they leave the river has potential impacts on later life history choices. Parameters that may be affected by migration choices of these post-smolts are: growth rate; fecundity and timing of first spawning migration. We used acoustic tags to study post-smolt sea trout migration behaviour in the near shore environment. Unlike radio tags and PIT tags, acoustic tags actively transmit a signal that can be heard effectively in the marine environment.

From 28 March to 23 April 2014, 50 sea trout smolts were captured on the eel rack at East Burton, River Frome. Eel racks represent a piece of cultural history as they were built many decades ago to trap down-stream migrating silver eels for commercial purposes (see picture above). The eel rack at East Burton has been restored and is now an excellent tool for GWCT to intercept down-stream migrating fish in a fish-friendly manner.

A sea trout smolt ready to be fitted with acoustic and PIT tags (circled).

The 50 smolts captured on the eel rack were measured, weighed and fitted with an acoustic transmitter and a PIT-tag (pictured on page 12). The acoustic transmitter was used to track the smolt movement through the lower river and their migration patterns within the estuary; this was recorded by acoustic receivers positioned in the lower river and throughout Poole Harbour (see Figure 4).

Of the 50 smolts, 45 (90%) individuals were detected entering Poole Harbour (i.e. detected at the saline limit or beyond). Two individuals were only detected on in-river receivers and three individuals were never detected after tagging.

The majority of observations were made in the smolt migration period but three individuals were recorded re-entering Poole Harbour between 22 July and the end of the lifespan of the acoustic tags (mid-August). All three individuals were detected entering the River Frome within 24 hours of re-entering Poole Harbour. After the end of the battery life of the acoustic transmitters a further two individuals were detected on the PIT systems in River Frome so at least five of the tagged individuals migrated back into the river after only a few months at sea. Having invested much energy in smoltification and undertaken the high risk journey to sea, re-entering the river only months after leaving is a strategy that fisheries scientists are still trying to understand.

This work is at a preliminary stage and an in-depth analysis of loss rates, migration timing and transition times will be performed this summer.

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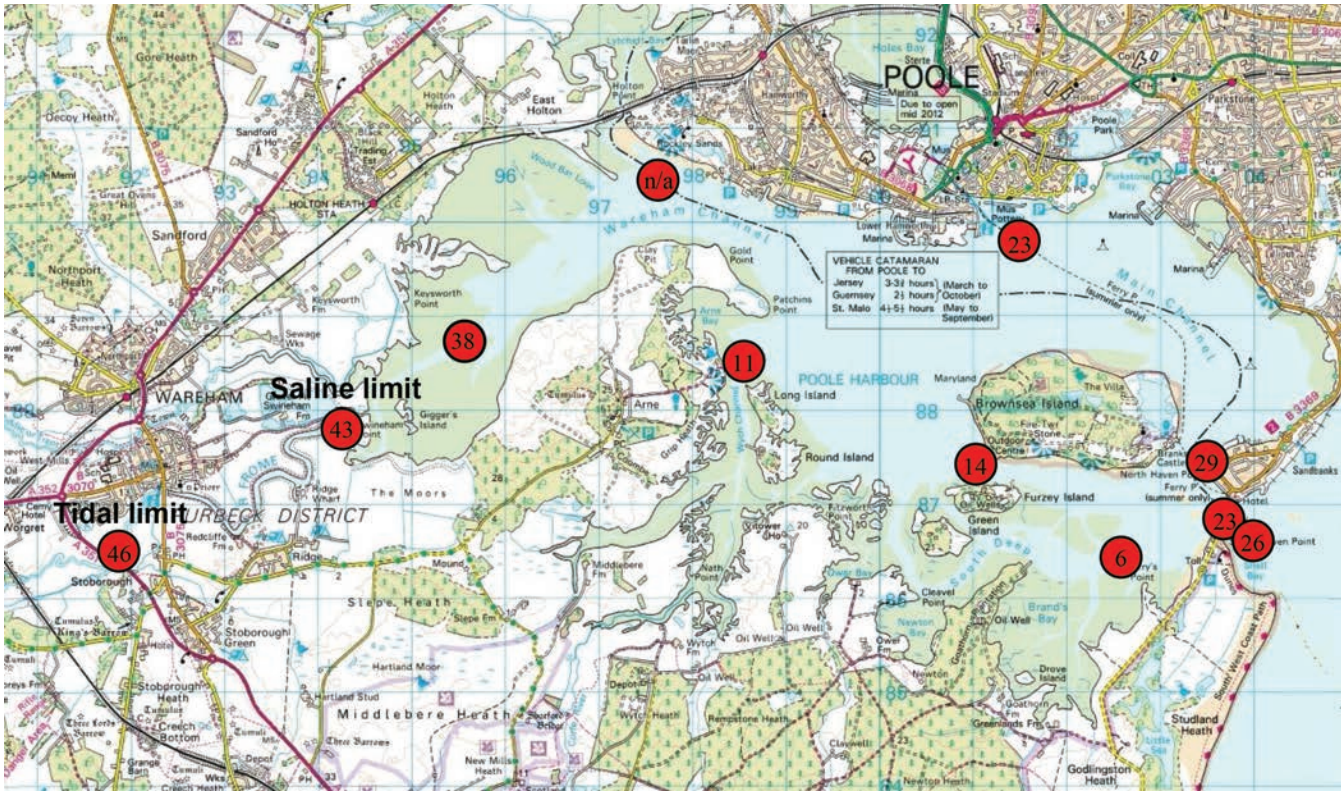
Cefas

Figure 4

Locations of acoustic receivers in Poole Harbour with the dot size indicating their approximate detection range. The numbers indicate the number of tags detected by that receiver.



8. Wylye Grayling Long-term Study

We are investigating the effects of environmental change on population dynamics of grayling in the River Wylye.

Historically, the European grayling (*Thymallus thymallus*) was considered a pest species that impacted stocks of other game fish, including brown trout *Salmo trutta*, by competing for their foods, occupying their habitats and even eating their eggs. Convinced that grayling and trout could live side-by-side harmoniously, the 1984 Water Warden of the Piscatorial Society, Hal Thirlaway, began a programme to monitor annual changes in the Wylye grayling and trout populations in 1984. The Wylye grayling population was sampled regularly from 1984 until 1996 and then annually thereafter.

Nowadays, up to 12 independent sites are sampled. All individual grayling are marked with uniquely coded tags and sampled for scales. Using these data we can estimate changes in their population size, follow changes in the life-histories of individual fish and follow changes in their growth and condition.

To our knowledge, this now represents the longest dataset on European grayling anywhere in the world. It is only with such long datasets that we can hope to answer questions about the effects of changing environmental conditions on fish population dynamics.

The main partners are GWCT, the Piscatorial Society and Natural Resources Wales.

What will the project deliver?

The aim of this project is to study the population dynamics of this grayling population to understand why it is declining and what management actions can be taken to rescue it. More specifically we plan to investigate ecological and conservation questions, such as:

- How does river flow effect grayling recruitment, specifically the effect of floods on "egg washout"?
- What are the short- and medium-term consequences of habitat restoration on the composition of salmonid populations and effects on individual fish movements?
- How do grayling population dynamics affect the population dynamics of inhabiting trout and vice versa?

Why is this important?

European grayling belong to the family Salmonidae with salmon and trout. Research suggests that grayling could be an early indicator of salmon and trout population changes because they are more sensitive to environmental change:

- Grayling are the first among salmonids to perish after river pollution events, perhaps because of their relatively smaller liver produces a lower concentration of detoxifying enzymes;
- Unlike salmon and sea trout that spend a part of their life in the ocean, the entire grayling life-cycle, from egg to adult, occurs in freshwater rivers that are more sensitive to environmental change than oceans; and
- Grayling lay their eggs in shallow gravels from where can be washed into unsuitable environments during floods: the consequences of "egg washout" will be relevant to salmon and trout if the intensity of floods increases under predicted climate change conditions.

For these reasons, studies on Grayling can give insights into the issues faced by our salmon and trout and might act as an early indicators of problems that might affect them.

Wylye Grayling Long-Term Study

Cyfoeth Naturiol Cymru Natural Resources Wales

THE PISCATORIAL SOCIETY

Environment Agency

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We are working with a number of partners on the Wylye Grayling Long-Term Study.

Adult grayling with a Visible Implant tag with individual code behind the eye.

9. Student projects 2014

Atlantic salmon have a complex life cycle which is punctuated with challenges and dangers, from pollution affecting eggs in the riverbed gravels to predators in the open seas: it's a mystery that any salmon survive. Indeed, the numbers of salmon returning to British rivers has fallen by up to 70% since the 1970s, despite restrictions on harvest in rivers and at sea. Today, the salmon life cycle is even more challenging because it plays out in an increasingly changing world: river water temperatures and flows have and continue to change as humans exert ever more pressure on the environment. Elinor Parry and Jacopo Cerri are working with the GWCT Fisheries team to investigate whether these changes have affected the Frome salmon population.

Elinor, an MRes student from Cardiff University, is studying how climate has affected the distribution and recruitment of salmon, with a focus on the effects of river flow. In low flow years, the amount of spawning habitat available could be restricted as adults struggle to pass man-made obstructions within the river, rendering river headwaters inaccessible. For those that do manage to construct redds – the nest sites which the eggs develop in – the emerging fry might be at a disadvantage due to poor habitat quality and high competition for resources. Overall, this could cause a downstream shift in juvenile salmon increasing local density which in turn can reduce growth and survival in freshwater as well as in the marine life-stages.

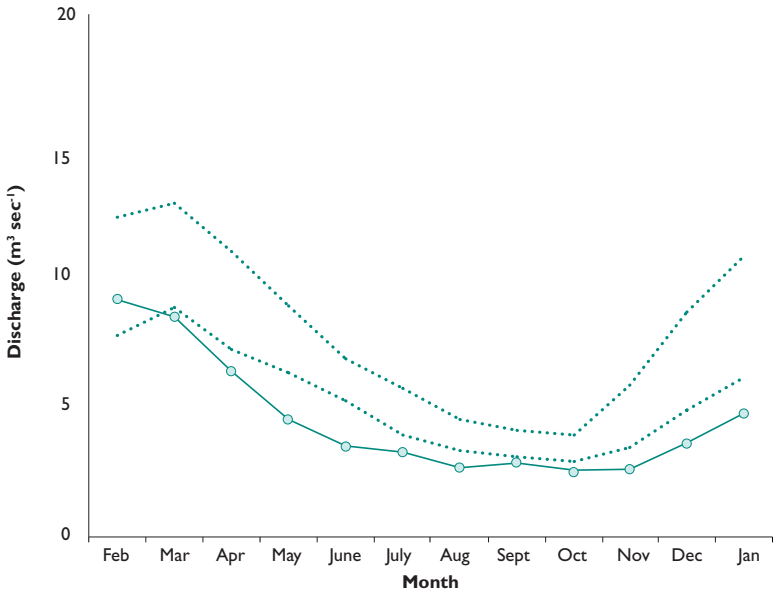
Jacopo, an Erasmus Plus student funded by the EU, is studying the effects of environmental change on overwinter survival of salmon parr. Previous studies have shown that temperature affects individual activity: parr exposed to temperatures below 7°C and above 22.5 °C have difficulty feeding and suffer stalled growth. Similarly, extreme river flows restrict available suitable habitat and food: low flows reduce the wetted area and increase competition for limited resources while high flows render habitat unsuitable because it is too deep or energetically demanding to hold position in the water currents.

Results from Elinor and Jacopo's studies will help us to better understand how changing river conditions affect juvenile overwinter survival and adult spawning behaviour. Ultimately, this information will aid in future conservation efforts on the Frome, and other southern chalk streams, by informing guidelines for abstraction and riverine modification.

Young of the year - juvenile salmon (top) and trout (bottom)

Figure 5

One of the longest droughts experienced on the river Frome was in 2011. The mean monthly flow (solid line) was lower than the normal range of flow (dashed lines) for the entire year. This had a large impact on parr survival to smolts.



Is fish movement affected by beavers?

Populations of re-introduced and escaped Eurasian beaver (*Castor fiber*) currently exist in England and Scotland and concerns have been raised that beavers, and more specifically the dams that they construct, may negatively impact populations of migratory fish, particularly salmon and trout, by impeding their movements and fragmenting important habitats.

Robert Needham, a PhD researcher from the Universtiy of Southampton, part-funded by GWCT, has spent one autumn spawning season and one spring juvenile migration season in the north of Scotland using PIT telemetry to assess the ability of trout to pass a series of beaver dams in both the upstream and downstream directions.

The field site consists of a Loch with two feeder tributaries, with one resident family group of beavers which have been present since 2007. One feeder tributary has been dammed in four places while the other tributary has had no beaver activity.

Data analysis is very preliminary at the moment; but, to date:

- 331 Trout have been PIT tagged
- Upstream passage passed dams has been confirmed
- Downstream passage passed dams has been confirmed
- Spawning has been observed above the fourth dam

Much has been said in the media about beaver impacts - negative and positive - and GWCT looks forward to following this project as it provides evidence about this new conservation issue.

Tree felled by beavers in Scotland

Wild Scottish beaver

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The Game & Wildlife Conservation Trust

For over 75 years our scientists have been researching why species like the grey partridge, corn bunting and black grouse have declined. We are continually developing practical measures to reverse these declines.

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