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Mission Statement

"To preserve a valuable part of our natural heritage for the enjoyment of current and future generations, through the conservation, enhancement and development of our freshwater habitats and the fisheries they support."

Board of Trustees

Senior biologist *Brian Shaw* *brian@ayrshireriverstrust.org*

Biologist *Peter Minting* *peter@ayrshireriverstrust.org*

Administrator *Janette Galbraith* *janette@ayrshireriverstrust.org*

Website *www.ayrshireriverstrust.org*

Cover photos:

Background: The River Ayr at Barskimming
Inset:
Salmon leaping at the Linn, River Girvan
Dalmellington Primary pupils releasing salmon fry
The water vole, an Ayrshire species under threat
Freshwater pearl mussels

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Ayrshire Rivers Trust

Chairman's Introduction

The Trust has completed another busy year, with our biologists taking on a great deal of new project work. Our seventh Annual Report, covering the year to 31st January, 2008 describes our current activities. Pete Minting has done a great job in putting it together, with the help of Brian Shaw and Janette Galbraith.

Now that we have been carrying out electrofishing surveys for over five years, we have presented a review of the data collected (p6-10). This review gives a broad indication of the most healthy and least productive areas of our rivers.

We report on the incredible journey of a 10lb 'sea trout' caught on the River Doon which turned out to be a trout/salmon hybrid, originating from the River Tyne (p11). Perhaps it thought it could take a short cut back to the Tyne!

The ever popular Salmon in the Classroom project expanded to 12 schools, with 14 signed up for spring 2008 (p12-13). We are now at capacity unless we increase our staff levels.

The water vole is under severe pressure in Ayrshire, so it is a 'feather in our cap' to be leading local research into these delightful creatures (p18). We have also started work on another threatened species, the freshwater pearl mussel, which is clinging on to life in the River Doon (p14).

Over the year our fundraising continued but without the usual boost from our Auction Dinner, which was not held in 2007. However the Country Fair at Skeldon (near Dalrymple) was a great success, with ice cream in great demand on a sunny day! The Fair raised over £2,800 but with expenses continuing to rise we are delighted to have sponsorship this year, from the Dawn Group. Stanley Brodie has again kindly provided the venue for the Fair at Skeldon – so we hope to see you there on 1st June 2008! The Fisherman's Supper was an enjoyable occasion for our angling members at the end of the fishing season. Also thanks to Geoff Lockett, who inspired us to combat obesity with a "Sponsored Diet" raising £1,150!

The Income and Expenditure Accounts (p26-27) show a deficit of £3,987 which is a reasonable result, considering the absence of an Auction Dinner (which raised £15,500 in 2006). Income from membership was steady – but we could always do with more members. Although grants received fell by some £19,000 this was more than compensated by income from consultancy fees of around £25,000. Expenses rose by some £4,800, mainly due to increased employment costs. Accounting has become a more complex procedure under new OSCAR charity regulations.

In finishing I would again like to thank all those who have supported us over the past year – the suppliers of grants and consultancy work, donors, members and helpers (see back cover). And of course a big thank you to all our hard working staff – Brian Shaw, Pete Minting and Janette Galbraith.

One of our founding trustees, Phil Haughton, decided to retire during the year. Many thanks to Phil who has been a hard working member of our team and an invaluable "hand on the tiller". His input is missed at meetings but he has kindly agreed to give us a hand now and then. We welcome Tom Lothian from Ballantrae as a Trustee. His background in the police gives us a new dimension.

PETER KENNEDY
Chairman

Biologist's Summary

2007 was a typically busy year for the Trust. In addition to our routine fish and invertebrate surveys which take up most of our time from June to October, we began research on local populations of freshwater pearl mussels and water voles. The Trust has an 'all-species' remit and we believe broadening our horizons will, in the long-term, strengthen the Trust.

Trust staff spend a considerable amount of time applying for project funding. This can be very frustrating if applications are unsuccessful. However, we achieved a good strike rate in 2007 with the majority of proposals proving successful. Time spent designing a project to control non-native riverside plants paid off, as we secured funding to carry out work in 2008 from the Esmée Fairbairn Foundation via Rivers and Fisheries Trusts, Scotland (RAFTS).

The Trust has been gathering data across Ayrshire for five years, some of which is displayed in the electrofishing summary presented in this report (see p6). We now have a good understanding of the locations of the productive areas of our catchments, although there can be wide annual variations in fish abundance, particularly in the lower reaches of our rivers. We are now reaping the rewards of spending time gathering this information and the Trust's role as an authority on Ayrshire rivers is becoming increasingly recognised.

The FRS contract has required a lot of staff time over the last two years but was completed on time and to a high standard. Further funding for the production of fishery management plans over the next three years has now been approved. Through consultation with interested parties, we hope to be able to produce effective fishery management plans and take a proactive role in their implementation.

BRIAN SHAW
Senior Biologist

Membership

Members receive many benefits including free newsletters, Annual Reports and invites to special events run by the Trust. Membership cards can also be used to obtain discounts at local angling stores.
For those interested in joining the Trust, a membership form can be downloaded from the website at:
www.ayrshireriverstrust.org
or telephone Janette Galbraith on: 01292 525142.

Electrofishing results from 2003 to 2007

This year the Trust has reviewed all the information collected during electrofishing surveys since 2003. Electrofishing surveys are carried out to try and assess the health and distribution of juvenile salmon and trout populations. Each year (including 2007) the Trust has surveyed approximately 150 sites across Ayrshire. The results give a broad indication of the comparative health of Ayrshire's rivers, as salmon and trout only thrive in the cleanest rivers.

The maps on the following pages look similar to those seen in previous Annual Reports but this time the colour of the dots represents the ***average*** of the results collected between 2003 and 2007. Given the wide variability of results at any one site between years, it is very useful to be able to combine a series of results. It then becomes clear which areas of a catchment produce a great deal of juvenile salmon and trout and which do not.

It is worth noting that these electrofishing surveys only assess the situation in freshwater and do not indicate how many adult salmon or sea trout will return from the sea. However, it is likely that a large proportion of the wild adult salmon or trout which are caught by rod fishing will derive from the most productive areas of the river.

The biologist's 'iron maiden' – electrofishing kit


Fish are captured, recorded and returned

Ayrshire Rivers Trust uses the Scottish Fisheries Coordination Centre (SFCC) national classification scheme (Godfrey, 2005) to assess juvenile salmon and trout densities at electrofishing sites. Results from over 1,600 sites across Scotland have been used to create categories ranging from absent to excellent. These categories are shown on the maps using a 'traffic light' system to make it easy to see areas of the catchment which typically support high or low densities of the species concerned. Although it is unfair to compare a fertile lowland stream with a highland stream running over granite, a categorisation helps to identify local trends and spot unusual patterns which may be the result of pollution.

As it is difficult to relate individual dots on the maps to specific tributaries, some areas of the map have been highlighted and discussed in more detail. Some tributaries, such as the Glenmuir Water on the River Ayr, consistently produce high densities of salmon fry and parr. Others do not, despite being accessible to salmon (such as the Failford Burn on the River Ayr, which is often polluted). Trout tend to dominate in small streams, with salmon dominating in the main channel. In sections which are inaccessible to salmon due to obstructions, only non-migratory fish such as resident trout will be recorded.

The complexity of salmon and trout ecology makes transparent mapping a difficult task, especially when trying to represent an area as large as Ayrshire on a single page. Some of the key points should be apparent, for instance few sites in the River Irvine catchment contain high salmon or trout densities. Accessible sites in the upper River Ayr, upper Girvan and whole of the Stinchar tend to contain high salmon densities.

At present there is no national classification for timed electrofishing, which the Trust also carries out in order to assess the abundance of salmon fry in main river channels. Instead the Trust uses a local ranking, based on results from the last five years surveying in Ayrshire.

The Trust also collects samples of animal life from the streambed to assess water quality and see if pollution has recently occurred. The results follow a similar pattern to those of electrofishing sites – places with high water quality usually have diverse, abundant populations of insects such as mayflies and other aquatic fauna.

Once patterns in the abundance of fish and other instream life have been identified, it is sometimes possible to link the observed pattern with a cause. In many cases where fish numbers are low it is not possible to identify a cause, but it is necessary to have a baseline when trying to prioritise plans for river restoration work. Some examples of healthy versus impacted watercourses are shown below:

First class habitat on the Glenmuir Water

'Irish bridge' obstructs migration, Fenwick Water

Glenmuir Water, Lugar, River Ayr High salmon and often trout densities Excellent water quality and habitat	**Fenwick Water, Fenwick, River Irvine** No salmon – obstructions, habitat loss Potential for restoring salmon population
River Garnock burns near Dalry High salmon densities below obstructions Good water quality on west side of catchment	**Upper River Doon, above Loch Doon dam** Small resident trout, salmon rare Dam hindering access, plus acidification
Gower Water, Darvel, River Irvine High salmon and trout densities (Although at risk of pollution from farming)	**Quarrelhill Burn, Dailly, River Girvan** No salmon but trout upstream of mine Pollution from disused coal mine
River Stinchar, Ballantrae High salmon densities Best water quality of an Ayrshire river	**Dyrock Burn, Kirkmichael, River Girvan** Few salmon or trout – diffuse pollution from intensive livestock farming
Dunaskin Burn, near Patna, River Doon High trout and (in accessible reaches) salmon densities. Good water quality and habitat	**Failford Burn, Tarbolton, River Ayr** Salmon and trout almost absent Diffuse pollution from farming and sewage

These examples are all cases where the situation has remained fairly constant since 2003, according to the data collected. In some areas the Trust is trying to improve salmonid productivity. Hopefully an improvement will be seen in the Dyrock Burn, where several kilometres of bankside fencing have been installed to protect water quality. In other cases it is difficult to find a solution and it may take many years for a change to occur.

Diffuse pollution from farming and sewage (treated and untreated) is probably the single most important factor affecting wild salmonid production in Ayrshire's rivers. The Dyrock Burn and Failford Burn are two examples of where diffuse pollution has a chronic effect but there are many others. Most of the lower River Ayr and lower River Irvine catchments are affected by diffuse pollution and rarely produce high densities of juvenile salmonids. This is regularly recorded by timed electrofishing, even in areas (such as just below Tarholm Bridge near Annbank on the River Ayr) where spawning adults are seen and habitat is excellent. In such cases, poor water quality seems to be the most likely cause.

The Fenwick and Craufurdland Waters have the potential to support a salmon population north of Kilmarnock but access is prevented by two obstructions. Black Rocks waterfall in Kilmarnock was passable by salmon until the deep pool below the falls was concreted

following a drowning accident. Further upstream a multi-pipe culvert or 'Irish bridge' which forms a road crossing near Dean Castle Country Park also hinders access (see picture above).

A few salmon manage to pass through Loch Doon dam every year (see section on fish counter, p20). Loch Doon dam is part of a hydro-electric power (HEP) scheme which has a major effect on the river flow and ecology of the River Doon. Acidification, exacerbated by conifer forestry since the 1970s, also hinders salmon production in the upper Doon.

Some areas of the map show clusters of black dots (salmon or trout absent) which are mainly due to natural obstructions, for instance the Water of Coyle on the River Ayr where there is a large natural waterfall. Large areas of the Duisk sub-catchment of the River Stinchar (around Barrhill) which are inaccessible to salmon but should still support plenty of resident brown trout do not, because of large areas of conifer forestry planted too close to watercourses.

Conifer forestry is often bad news for salmonids

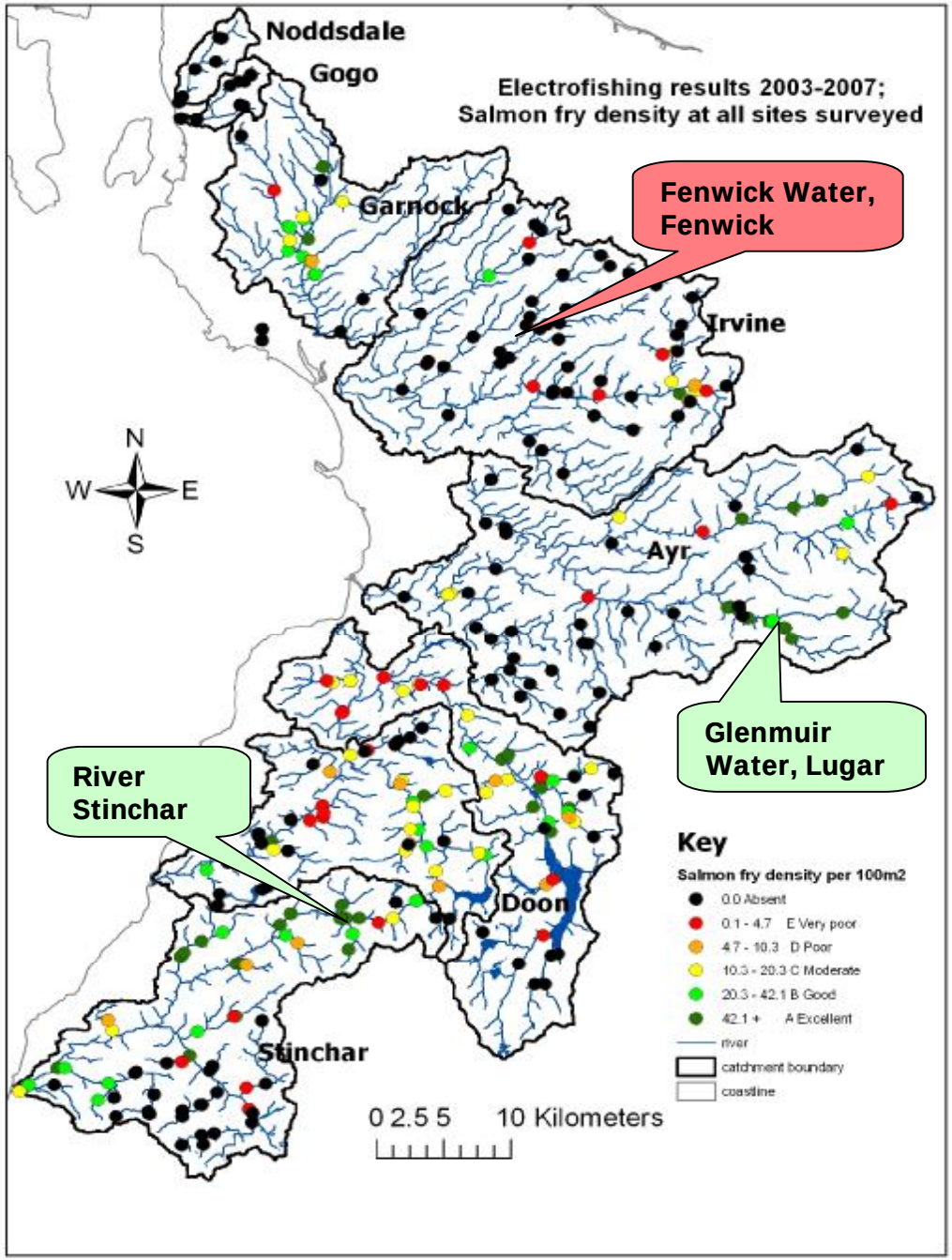
Coal mining can pollute and divert burns

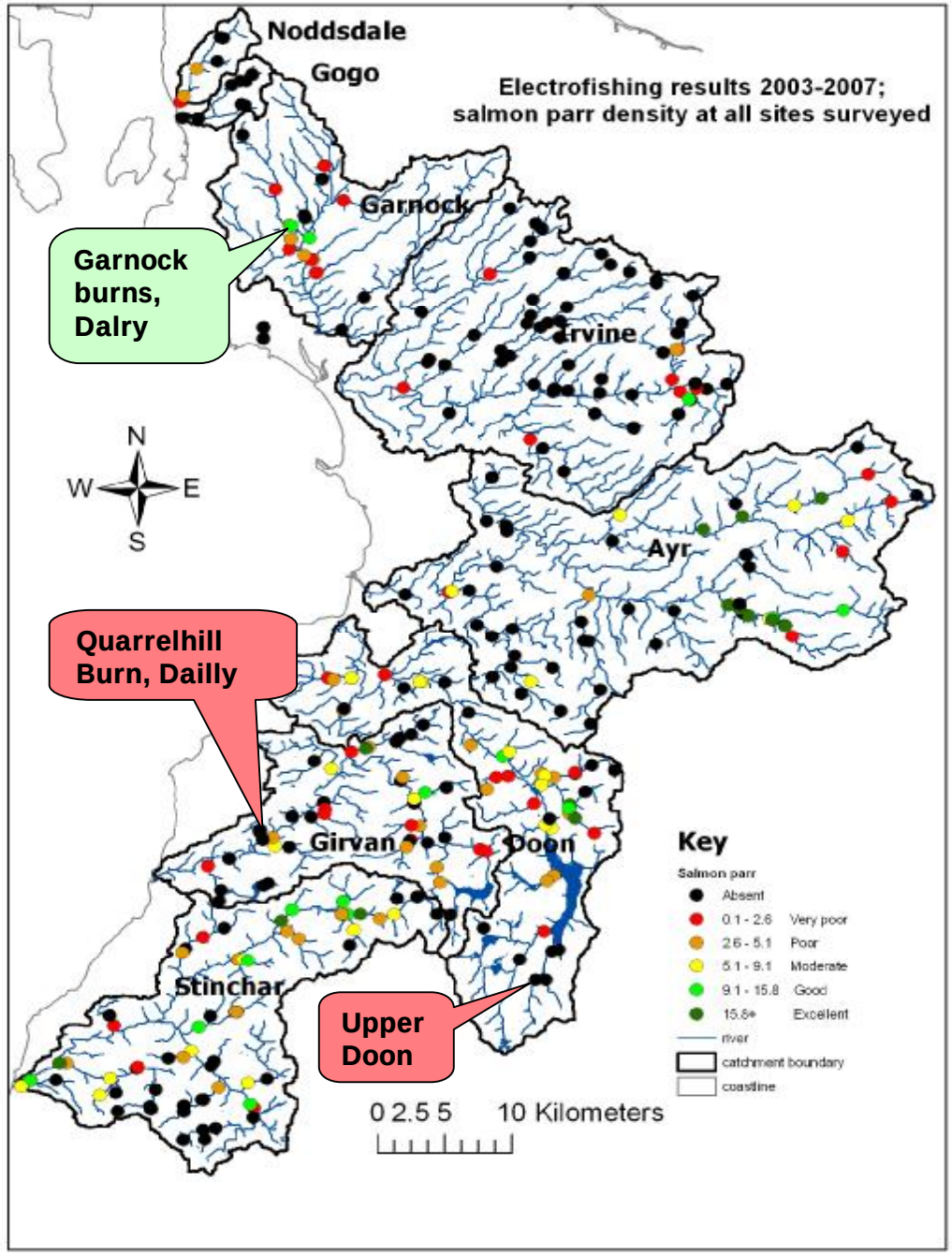
Despite many negative scenarios, there are places in Ayrshire where high salmonid densities are consistently found. These include the River Stinchar, the upper River Girvan and tributaries above Straiton, the Lindsayston Burn at Dailly on the River Girvan, the Dunaskin Burn on the River Doon, the main River Ayr at Sorn and nearby Whitehaugh Burn, the main River Irvine at Hurlford and several parts of the middle and upper River Garnock catchment. The Gower Water at Darvel is one of the most productive tributaries of the Irvine but is threatened by pollution from farms (see report on pollution incident, p19).

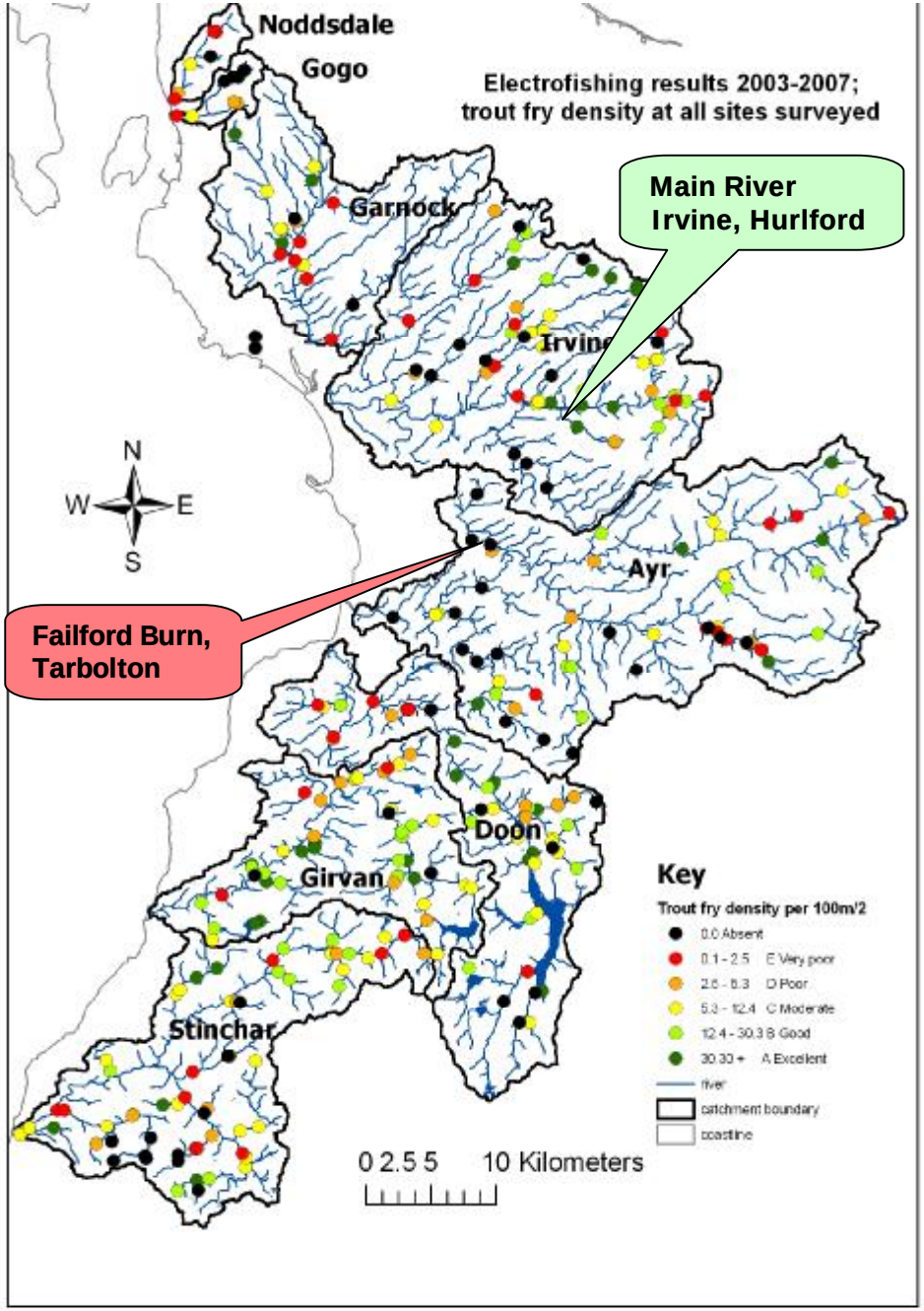
The productive Glenmuir and Guelt Waters drain from a vast area of moorland east of Cumnock in the Lugar catchment. These are constantly threatened by opencast mining and the Trust has made clear the importance of these burns in responses to planning proposals. Similarly the Greenock Water near Muirkirk is productive but ironically threatened by the economic value of the underlying Coal Measures. Coal Measures include limestones which (when undisturbed) provide a slow input of minerals which benefit instream life in a number of ways, including protection against acidity derived from atmospheric pollution.

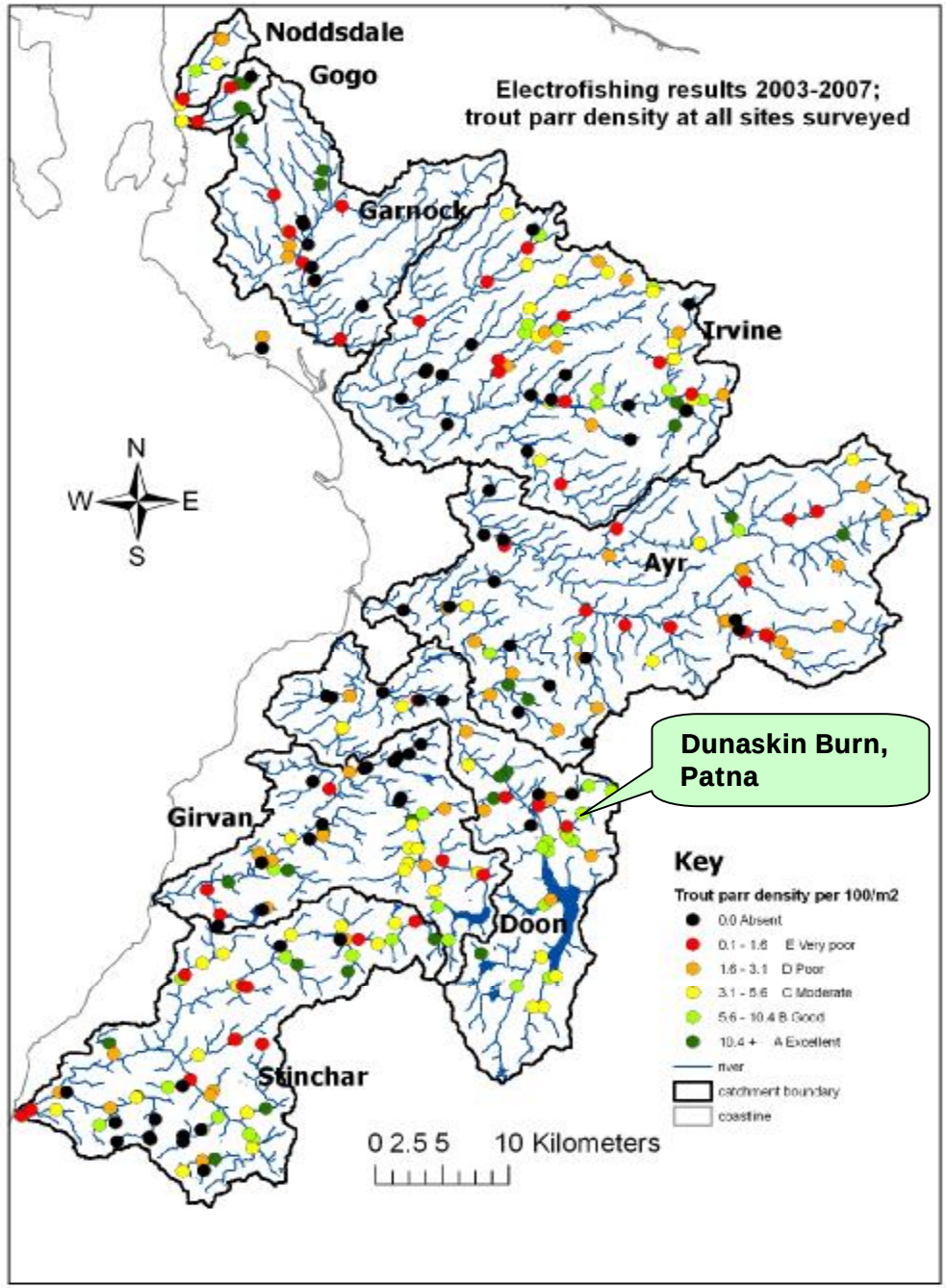
Sites with such abundant fish populations would benefit from increased legal protection. At present the only statutory designation (specifically for fish) in Ayrshire is the classification of Loch Doon as a Site of Special Scientific Interest (SSSI) for its population of Arctic charr. The nearest river classed as a Special Area of Conservation (SAC) for salmon under European law is the River Bladnoch in Wigtownshire.

The River Stinchar is the healthiest major river in Ayrshire and consistently one of the most productive in terms of juvenile salmon. It appears that the importance of this river in terms of salmon productivity has not been fully recognised. The Trust considers that it is vital to protect rivers which are relatively pristine, while trying to help those which are already suffering from pollution, development and habitat loss.









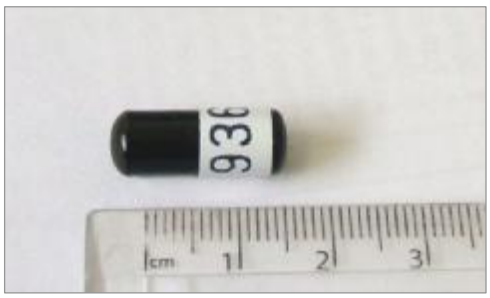
Epic journey by record breaking hybrid

On the 28th July 2007, local angler John Veitch caught what was thought to be a sea trout weighing 10lb 2oz in the River Doon. Sea trout of that size are very rare in Ayrshire and its capture caused some excitement. John, who has been fishing the Doon since he was seven, said: “It was the most powerful fish I’ve ever caught on the river.”

Although sea trout are usually released, this fish was deeply hooked and ended up on the dinner table. Here an amazing story began to unravel, when a tag was found inside the fish.

The tag revealed the fish had left the River Tyne estuary on the other side of Britain on 4th May, 2005. At the time the fish was just 15cm long, as it migrated into the sea from the river. The tag was implanted into the stomach of the fish, during a project to monitor smolt movements in the Tyne estuary by the Environment Agency. This type of ‘acoustic’ tag relays its position to floating receivers placed at strategic locations.

The tag and scale samples showed the fish spent two or three years in the River Tyne, followed by just over two years at sea. The fish showed a high growth rate, typical of sea trout from the north-east, but the scales showed no evidence of breeding activity. West coast sea trout tend to be slower growing and a fish of such size from Ayrshire would probably have already spawned and be several years older.



Left: the tag found inside this remarkable fish

Further investigation revealed that the smolt had been recorded as a wild salmon smolt. This conflicting information, combined with the fact that the adult looked like a sea trout, prompted genetic analysis of a scale sample by the Freshwater Fisheries Laboratory in Pitlochry. This proved the fish was really a sea trout/salmon hybrid, with a trout mother and salmon father. Hybridisation between wild salmon and trout sometimes occurs but few hybrids attain this size and none are known to have bred successfully. This seems to ensure salmon and sea trout remain as separate species, although they are genetically similar and derive from a recent common ancestor in evolutionary terms.

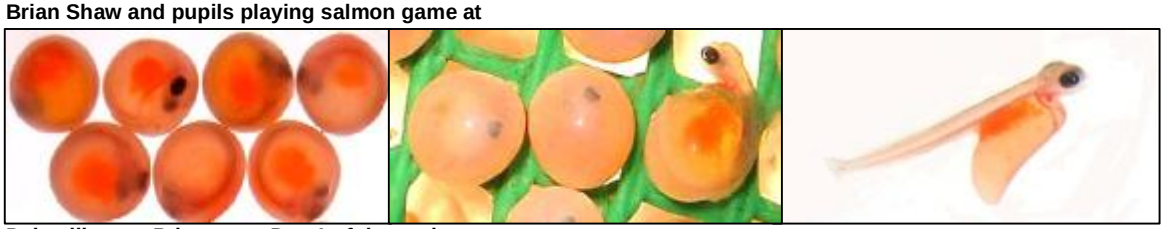
Until now, Alan Youngson (a fisheries scientist at Pitlochry) had claimed the unofficial “world record” for a rod caught salmon/trout hybrid, with a 7lb fish from the River Don near Aberdeen. At the time, Alan pointed out that the fish was sadly doomed to reproductive failure, with no hope of passing on its genes. But at least these giants have managed to enter the record books! Not satisfied with being a giant hybrid, the Tyne fish seems to have attempted a second record for ‘most random migration’. Normally a salmon or sea trout would return to its home river to breed, but this fish refused to conform. The route it took from Newcastle to Ayrshire, whether south via the English channel or north past John O’Groats, will probably remain a mystery.

Salmon in the Classroom 2007

This popular project expanded again in 2007, with 12 schools taking part; Barr, Dailly, Cairn and St Cuthbert's in Maybole, Minishant, Heathfield, Dundonald, Tarbolton, Catrine, Patna, Dalmellington, Muirkirk, plus Dolphin House Education Centre at Culzean. A good geographical spread across Ayrshire is now being achieved, thanks to a growing number of schools and funders keen to get involved. Fourteen schools have signed up for 2008 including three in north Ayrshire. Salmon in the Classroom now forms a large part of the Trust's work from February to June. There are three main stages to the project;

- Introduction, presentation, games and installation of salmon aquarium
- Care of salmon eggs and release into river three weeks after hatching
- Re-visit river for electrofishing demonstration and fieldwork

Brian Shaw and pupils playing salmon game at



Dalmellington Primary on Day 1 of the project

Salmon eggs hatch in a classroom aquarium at 8ºC and are released back into their home river

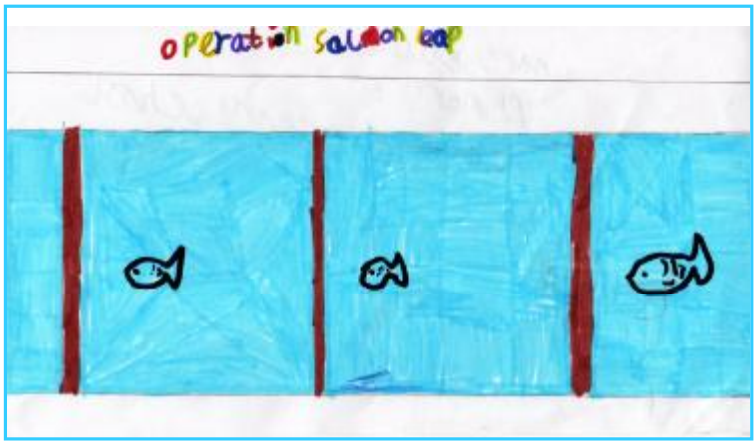
Dalmellington pupils releasing salmon River Girvan

Dailly Primary at the Lindsayston Burn,

Taking pride in their work

Many of the pupils at the schools involved have completed posters based on the lifecycle of the salmon or another aspect of river wildlife. The project provides many opportunities for creativity. Teachers often remark that the project gives pupils with an interest in wildlife and outdoor activities a chance to shine. Others begin to develop an interest in biology.

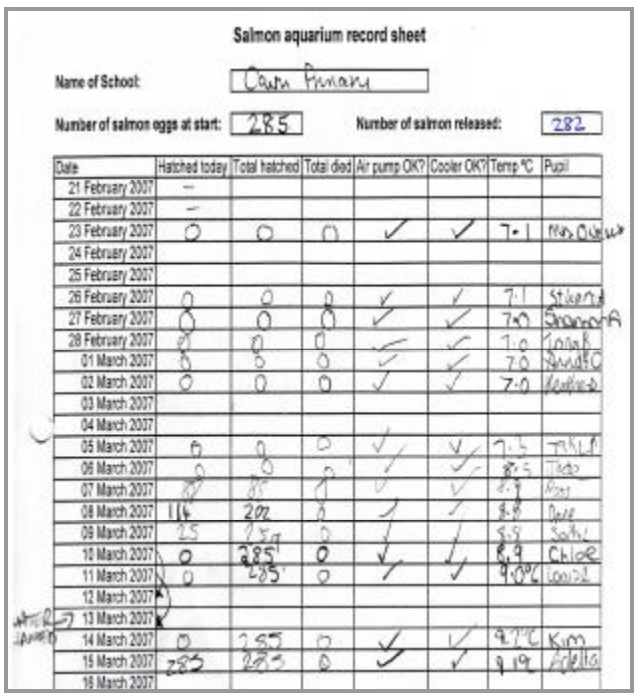
In 2007 Brian Shaw asked pupils at Dundonald Primary to come up with a name and logo for a fish pass project on the River Irvine. The idea is to incorporate the name and logo into any publicity and riverside signs once the fish pass is built.



The winning entry, 'Operation Salmon Leap' by a P6 pupil at Dundonald Primary

The pupils are asked to take responsibility for the salmon aquarium and individuals are assigned specific days when they have a series of checks to complete and record (see salmon aquarium record sheet example below).

The thermostatically controlled cooling system works within a degree and the Trust remains in frequent contact with the school, so development of the young salmon or 'alevins' can be carefully controlled. This means the timing of the release day at the local river can be planned so that the fish are at a suitable stage for release, or if necessary maintained over the Easter holiday.

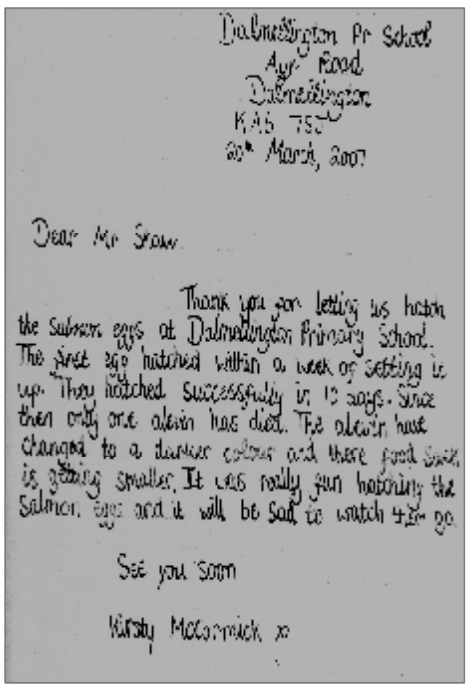


Salmon aquarium record sheet

Name of School: Cairn Primary

Number of salmon eggs at start: 285 Number of salmon released: 282

Date	Hatched today	Total hatched	Total died	Air pump OK?	Cooler OK?	Temp °C	Pupil
21 February 2007	–						
22 February 2007	–						
23 February 2007	0	0	0	✓	✓	7.1	Mrs Clark
24 February 2007							
25 February 2007							
26 February 2007	0	0	0	✓	✓	7.1	Shauna
27 February 2007	0	0	0	✓	✓	7.0	Shauna
28 February 2007	0	0	0	✓	✓	7.0	Jonah
01 March 2007	0	0	0	✓	✓	7.0	Amalia
02 March 2007	0	0	0	✓	✓	7.0	Heather
03 March 2007							
04 March 2007							
05 March 2007	0	0	0	✓	✓	7.5	Mikhail
06 March 2007	0	0	0	✓	✓	8.5	Tiegan
07 March 2007	0	0	0	✓	✓	8.9	Kirsty
08 March 2007	114	200	0	✓	✓	8.8	Dave
09 March 2007	25	225	0	✓	✓	8.8	Sasha
10 March 2007	0	285	0	✓	✓	8.9	Chloe
11 March 2007	0	285	0	✓	✓	9.0	Laura
12 March 2007							
13 March 2007							
14 March 2007	0	285	0	✓	✓	9.7	Kim
15 March 2007	285	285	0	✓	✓	9.19	Adelia
16 March 2007							



Dalmellington Pr School
Ayr Road
Dalmellington
KA6 7SZ
20th March, 2007

Dear Mr Shaw

Thank you for letting us hatch the salmon eggs at Dalmellington Primary School. The first egg hatched within a week of setting it up. They hatched successfully in 12 days. Since then only one alevin has died. The alevin have changed to a darker colour and their food sack is getting smaller. It was really fun hatching the salmon eggs and it will be sad to watch them go.

See you soon

Kirsty McCormick x

Many thanks to all the funders of this project. The Big Lottery Fund's Fairshare Trust has been funding 5 schools per year in the Maybole area. Scottish Natural Heritage (SNH) is helping to fund several schools in conjunction with local councils and local businesses such as Spirit Aerosystems of Prestwick have continued their support.

Freshwater pearl mussels in peril

Ayrshire Rivers Trust began a survey of freshwater pearl mussels in the River Doon in 2007. Freshwater pearl mussels were once common in the River Doon but are now rare. According to Dr Peter Cosgrove, who completed the last mussel survey of the River Doon in 1997; "The primary cause for the decline is almost certainly pearl fishing." Although pearl fishing has been illegal since 1998, the River Doon population shows no signs of recovery.

Freshwater pearl mussels have a fascinating life cycle (see diagram on following page) which includes hitching a lift upriver on the gills of salmonid fish. They can live for over 100 years but do not become reproductively active until 10-15 years old. Water quality in the River Doon is borderline for the survival of freshwater pearl mussels and this is probably hindering their reproduction. If no juveniles become established, there is a risk that the population will become extinct as the remaining adults die off.

Pearl mussels filter feeding (Sue Scott/SNH)

Scotland is a key global location for freshwater pearl mussels. According to Mark Young of Aberdeen University; "up to half of the world's known remaining populations with juvenile recruitment are in Scotland." Rivers with plenty of juvenile recruitment, such as the Aberdeenshire Dee, have been classified as Special Areas of Conservation (SACs) for freshwater pearl mussels. The River Doon has not been classed as a SAC for pearl mussels, as young mussels are very rare. In 2007, only one of six live pearl mussels found could be considered juvenile and the other five were at least 40 years old. This suggests that pearl mussels have not bred successfully in the River Doon for many years. No juveniles were found during Peter Cosgrove's survey in 1997. Despite the fact that the Doon has not been classed as a SAC for pearl mussels, Ayrshire Rivers Trust is keen to prevent extinction of the population, which is important in terms of local heritage and biodiversity.

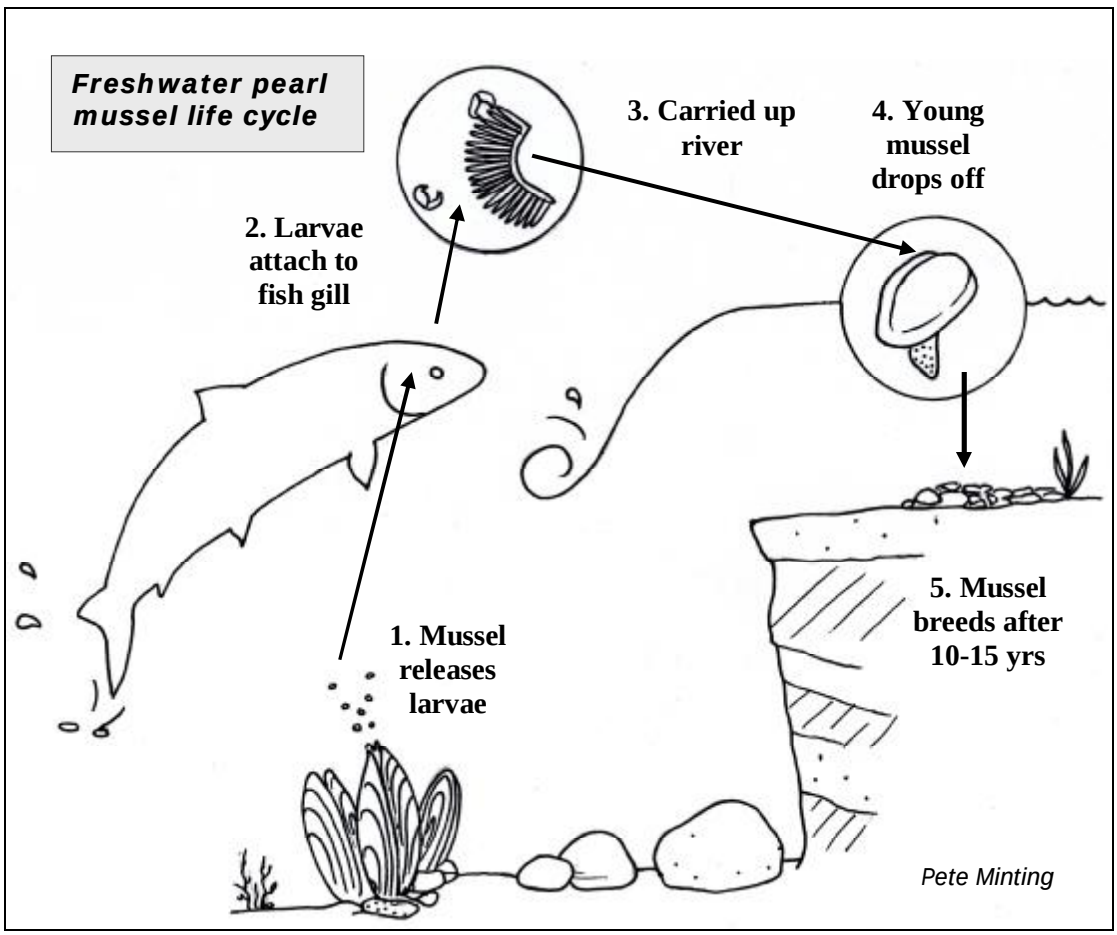
The water quality requirements of freshwater pearl mussels are even more strict than those of salmon. The animal rarely flourishes in rivers where the conductivity exceeds 100 microsiemens (a measure of the amount of dissolved substances) or where nutrient levels in river water are high. In the lower River Doon below Dalrymple, water quality may be too poor for young pearl mussels to become established, although a few adults remain. Conductivity in the lower River Doon is typically around 140 microsiemens, which, although not ideal, is much lower than in the neighbouring Rivers Ayr and Girvan. A large input of low conductivity water from Loch Doon helps to dilute pollution but inputs from farming, sewage and mines are a constant threat to pearl mussel survival. The Trust is also concerned about proposals to change the compensation flow released from the hydro-electric scheme at Loch Doon, which may affect the remaining pearl mussels.

Several attempts are being made to save freshwater pearl mussels across the UK, including efforts to artificially infect fish with pearl mussel larvae and rear mussels in captivity. The Freshwater Biological Association laboratory at Windermere in Cumbria and Queen's University in Belfast are both breeding freshwater pearl mussels in captivity. The slow growth rate of pearl mussels means that even if artificial breeding and restocking works, the benefit of the results will not be seen for many years. It has been suggested that when mussels are present in large numbers, they can help to keep a river clean by filter-feeding which

benefits fish and other wildlife. Captive breeding could be an option to save the River Doon population but the number of adult mussels remaining may be too low.

Ayrshire Rivers Trust will continue to survey the River Doon for pearl mussels in 2008 and try to confirm reports of pearl mussels in the River Girvan. Peter Cosgrove concluded that these were probably swan or duck mussels (*Anodonta* sp.) rather than freshwater pearl mussels (*Margaritifera margaritifera*). Water quality in the lower reaches of most Ayrshire rivers is rarely suitable for pearl mussels, although it is possible that a few individuals exist in sections with high salmonid densities and clean water. The River Stinchar has the best water quality of all Ayrshire's rivers but pearl mussels have not been recorded there since 1902.
Most Ayrshire rivers would have had a pearl mussel population before the impacts of agriculture, industry and over-fishing.

In 2007 only six live pearl mussels were found in the River Doon, along with 13 empty shells, despite many hours of searching. The exact locations of the live mussels are not being published as there is a risk of illegal pearl fishing. The Trust is keen to hear from anyone who has seen a mussel shell in their local river, but please bear in mind that it is illegal to disturb pearl mussels or even collect empty shells without a licence. The Doon survey is being funded by Scottish Natural Heritage and the River Doon District Salmon Fishery Board.



Freshwater pearl mussels have a very long life cycle, which depends on salmonid fish

Genetics reveal structure of salmon populations

A team led by Exeter University has produced results from a project which Ayrshire Rivers Trust has been involved in since 2004. The initial aim of the 'Atlantic Salmon Arc Project' (ASAP), was to build up a genetic profile of salmon populations across western Europe, including Scotland. Using the profile created, it should be possible to take a box of wild-caught salmon and identify, with a reasonable degree of confidence, the river origin of those salmon. This type of 'Genetic Stock Identification (GSI)' is proving useful in many countries in terms of salmon fishery management, including investigations of illegal fishing.

Genetic techniques are constantly improving and it may not be long before individual salmon can be assigned to their home river. Every wild salmon population evolves a unique genetic signature over time, because salmon normally return to the river where they hatched in order to breed. Sub-populations can develop rapidly as a result of this behaviour, which means that there is often little mixing with adjacent populations.

Appropriate genetic markers known as 'microsatellites' were used in this project to identify the population structure of salmon. Microsatellites are short repetitive sections of DNA which mutate at a suitable speed to reveal population structure but do not have a known function.

A 'dendrogram' or genetic tree has been produced from the results of the analysis (Dr Andrew Griffiths, *et al* 2007) which shows the position of each set of salmon samples, in terms of genetic distance. The tree shows that salmon are usually most closely related to those from an adjacent river, rather than those further away. As mentioned in last year's Annual Report, samples collected from the River Ayr are most closely related to those from the River Doon, the closest salmon river. Samples from within the River Ayr catchment (e.g. the main River Ayr versus the Lugar sub-catchment of the Ayr) are even more closely related to each other than they are to River Doon salmon. Follow-up tests have shown these differences to be stable over time. Atlantic salmon have re-colonised northern Europe and developed locally distinct genetic profiles since the end of the last major ice-age, around 12,000 years ago.

It is not yet known if stocking programs using salmon from distant catchments have had a significant impact in terms of inter-breeding with the wild populations studied. From the genetic tree it would appear not, as there are few instances where samples analysed do not conform to the general geographic trend. Those which do not conform are mainly those where the sample size was very small and possibly insufficient for effective analysis.

European Union funds for ASAP were secured by Westcountry Rivers Trust, led by Dr Dylan Bright. The next stage of the project includes action to conserve the salmon populations studied and in Scotland will include habitat restoration work in Ayrshire, Galloway and the Hebrides.



Salmon from Spain to Scotland were analysed. Above; a festival celebrating the first salmon of the Spanish fishing season made an interesting end to the project meeting held in northern Spain

Ayrshire Rivers Trust is now also a member of the SFCC biodiversity sub-group which is exploring the potential of genetic projects to help manage Scottish fish populations. There is scope for Scottish rivers and fisheries trusts to complete genetic studies in conjunction with Dr Eric Verspoor of Fisheries Research Services, who has just secured funding for a major

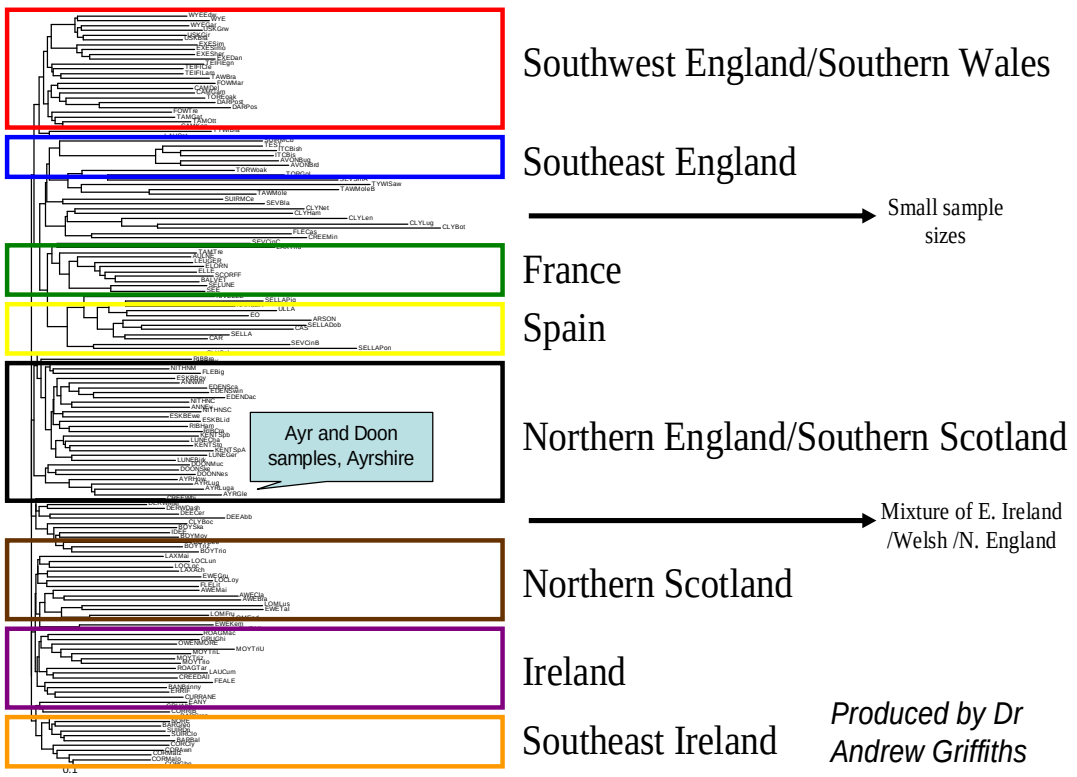
project on salmon genetics called SALSEA-Merge. Dr Verspoor is keen to help biologists answer questions about the structure of salmon populations in their local area.

Ayrshire Rivers Trust hopes to compare the genetic structure of local salmon rod catches with juvenile salmon populations. This will require a great deal of assistance from local anglers in terms of collecting samples, but will help to show which areas of the river catchment currently contribute most to the rod catch. This type of study has already been successfully completed by Dr Verspoor on other rivers, for instance on the Feochan river system in Argyll.

Exeter University's next salmon genetics project will examine the effects of stocking using native salmon broodstock in the rivers of south-west England. Few studies have been able to measure the success of salmon stocking using local broodstock but using genetic techniques, it should be possible to analyse the survival rate of stocked versus truly wild fish at all life stages, including returning adults. Dr Jamie Stevens, who leads the Exeter team, hopes this study will help assess the effectiveness and sustainability of stocking.

The potential for applying genetics to fisheries management is enormous. Over the past year the Trust has seen two other examples of where genetics has helped solve a local puzzle. In one case, it was possible to confirm the wild origin of a jar of illegal fish bait or 'putty' made from salmon eggs. In another case, it was possible to unravel the parental history of a tagged 10lb salmon/sea trout hybrid, which had migrated to Ayrshire from the River Tyne (see p11).

Population structure, Atlantic salmon



A. Griffiths (Exeter), G. Machado-Schiaffino (Oviedo), E. Garcia-Vazquez (Oviedo) & J. R. Stevens (2007) The Genetics Report for the Atlantic Salmon Arc Project: a report to the Westcountry Rivers Trust. Exeter University.

Help us save 'Ratty' from extinction

Ayrshire Rivers Trust has taken up the challenge of developing a Species Action Plan for water voles in Ayrshire. The water vole, best known as 'Ratty' in Kenneth Grahame's classic 'Wind in the Willows' is now considered one of the most endangered mammals in Britain, with a 90% decline in the last few decades. The decline in Ayrshire has been even more dramatic, with a 95% crash in numbers recorded between 1990 and 2006. Water voles used to be widespread in Ayrshire, particularly in fertile lowland rivers and burns. The main factors responsible for the decline are thought to be loss of suitable habitat and predation by introduced mink. The non-native American mink is a voracious predator, capable of following water voles into their underwater burrows and rapidly wiping out colonies.

The water vole is usually brown but can be almost black in upland areas (photo: Laurie Campbell)

In response to the decline, the Ayrshire Local Biodiversity Action Plan (LBAP) Group has selected water voles as a priority species for immediate action. Ayrshire Rivers Trust is now leading development of a plan to conserve and protect the remaining populations. The plan will focus on restoring habitat and targeted mink control, particularly in the vicinity of existing colonies.

Surprisingly one of Ayrshire's last water vole colonies is located near Troon town centre. Urban streams with good habitat can provide important refuges, possibly because mink avoid built up areas. The Troon population could be vital to the future of Ayrshire's water voles.

Under the government's new 'Scotland Rural Development Program' applications for grants from farms and estates which include plans to help water voles will be given a high priority. Any projects designed to improve degraded riverside habitat are likely to prove beneficial for water voles and a variety of other river wildlife. Captive breeding could also be used to help boost numbers in selected areas. Water voles (and their habitat) have full legal protection under the Wildlife and Countryside Act (1981) and as a consequence it is an offence to disturb them or cause them harm.

If you have recently seen a water vole in Ayrshire, or would like to get involved in work to protect them, please contact the Trust on 01292 525142 or email: info@ayrshireriverstrust.org

Making polluters pay

Following a serious fish kill caused by farm slurry in 2006, Darvel Angling Club has lodged a compensation claim totalling £16,000 for restocking costs and damage to their section of the River Irvine. The 2007 Ayrshire Rivers Trust Annual Report described the incident in some detail, but at the time it was not certain whether the polluter would be prosecuted. Following action by SEPA the farmer was eventually fined £1,000 in September 2007 but Darvel AC decided to take the matter further, via the Anglers Conservation Association (ACA) (http://www.a-c-a.org). The spill occurred when an umbilical hose, used to spread cow manure, ruptured whilst dangling across the Gower Water. The Gower Water is an important tributary for salmon and trout production. Many adult salmon and trout were suffocated by the manure, along with thousands of juveniles. Ayrshire Rivers Trust welcomes the involvement of the ACA as it has an impressive record of successful civil prosecutions and provides a mechanism for anglers affected by pollution incidents to receive proper compensation for damage to their fishery.

The Trust tackled a number of other incidents in 2007, including initiating a clean-up of diesel leaking into the lower Doon near Nether Auchendrane from a heating tank and an investigation of fish deaths caused by a broken sewage pipe crossing the Glaisnock Water at Cumnock. The most common types of pollution seen were spills of stored cattle manure and silage effluent from stored hay. Both of these sources can result in a white/grey bacterial growth with a fluffy appearance in the river (right). A negative effect on local river life is often recorded by the Trust in such cases.

Anyone coming across a pollution incident should contact SEPA **immediately** on **01292 294000**. If incidents are reported promptly and an accurate location is given, there is a very good chance that the source of the problem will be found and remedial action will be taken. SEPA officers now inform the Trust biologists routinely if there has been a fish kill as a result of a pollution incident.

Trust monitoring progress at Burn Anne, Galston

As part of a flood prevention scheme, contractors working for East Ayrshire Council have been carrying out extensive construction work in the Burn Anne and River Irvine at Galston. The works have involved extensive “hard” engineering of the banks and bed of both water courses. The ecology of the burn has suffered major disruption as a result but one positive aspect is the installation of a fish pass at Balmoral Mill in Galston town centre (left). This will provide better access for migratory fish and should lead to the return of salmon to the Burn Anne in due course.

Fishery management plans

For the last two years, members of Rivers and Fishery Trusts of Scotland (RAFTS) and some District Salmon Fishery Boards have been providing the government with information on

factors limiting fish populations in their area. This work has been completed as part of a contract for Fisheries Research Services (FRS). Following completion of the last two year's work, FRS has agreed to a further three years of collaboration with RAFTS members. This will include production of fishery management plans for every major river in Ayrshire.

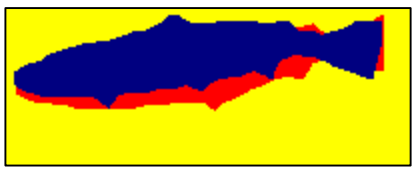
The FRS contract work has been an excellent opportunity for the Trust to review its existing data resources. The next stage, fisheries management plans based on local research findings, will summarise what needs to be done to restore fisheries to good health, who will be involved in the delivering the work and where the funding should come from. Although fisheries in Ayrshire tend to be dominated by salmon and trout, the fishery management plans will consider the requirements of all species.

Consultation will be a key element in the production of the fishery management plans as successful delivery will require the involvement of many partners. As Ayrshire Rivers Trust will have six management plans to produce, it is likely that production will be spread over at least two years. Detailed fishery management plans with commitment from the main partners will provide a blueprint for improvement works on each river. Water quality improvements across the European Union are now driven by the Water Framework Directive (WFD). The WFD requires that national governments work with other organisations in an integrated and planned manner, in order to achieve environmental improvements.

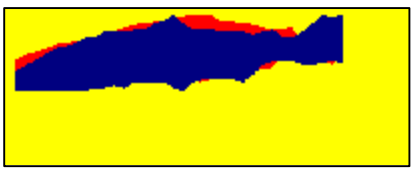
How many salmon really make it into Loch Doon?

A major step towards answering this question was achieved in 2007, with installation of a new fish counter in June. A dam at Loch Doon, built in 1936 as part of the Galloway Hydro-electric Scheme, hinders fish migration into the upper River Doon despite inclusion of a fish pass. Juvenile salmon are rarely found upstream of the dam but it is difficult to tell whether this is due to poor access or pollution, as the upper Doon also suffers from acidification. If large numbers of salmon do pass through the dam, this might point the finger at pollution.

Data collected in 2007 indicate that the number of salmon passing through is in the order of tens, rather than hundreds. Once a couple of complete years of data have been collected, our conclusions will be more confident. The new fish counter uses infra-red technology and is a great improvement on the previous system. It is virtually impossible for a fish to pass through the counter without being detected (unless there is a power cut). A couple of images of salmon from 2007 are shown below. Many trout movements were also recorded.



15/11/2007 12:30 67cm 0.62 m/s SALMON UP



07/12/2007 17:30 60cm 0.67 m/s SALMON UP

The counter records an image from both sides of the fish (red and blue), as well as approximate fish size, swimming speed, direction, time and water temperature.

Many thanks to dam operator Scottish Power for funding the new 'VAKI' type fish counter.

Land managers – what can you do for Scotland?

The Scottish Government is trying a new approach with its Scottish Rural Development Programme (SRDP). Instead of thinking about what a scheme can do for them, farmers and other land managers are being asked to consider what they can do to protect the countryside, whilst achieving sustainable business development.

The SRDP is the long-awaited replacement for the former Rural Stewardship Scheme and Land Management Contracts. £1.6 billion has been promised to deliver environmental, social and economic improvements for the Scottish rural economy over the next seven years. Under new scheme Scotland has been divided into eleven regions, each of which has been allocated specific regional priorities within a national framework.

Ayrshire is one of the eleven regions and its list of regional priorities can now be viewed online at: http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Ayrshire Here potential applicants can see which types of activity are likely to be favourably viewed by the committee set up to assess proposed projects. Under the former RSS scheme, application was on a points-based system. Wildlife friendly proposals such as riparian fencing, creation of species-rich grasslands and hedgerow planting were added to a points tally, with success on a threshold basis. Many RSS applicants were left disappointed when the threshold was repeatedly raised. Under the SRDP, applicants will be given a red, amber or green light at an earlier stage in the application process, with amber or green suggesting 'proceed to the next stage'. This filtering process should ensure applications fit with regional and national priorities before they have incurred significant expense.

Ayrshire's regional priorities emphasize water quality issues, with applications designed to reduce diffuse pollution likely to score highly. Measures which could reduce pollution include fencing along watercourses, increased slurry storage and improved nutrient budgeting. Compared with the RSS, SRDP has a stronger emphasis on collaboration between neighbouring farms. The Trust hopes to lead projects on a sub-catchment scale in conjunction with farmers and local rural advisory services. The Trust has identified a number of high priority tributaries where it would like to develop collaborative projects. Diffuse pollution in may seem insurmountable in intensively-farmed Ayrshire but it is hoped that by working in a systematic manner on a tributary scale, improvements will be achieved.

Ayr beach often fails EU standards for bathing water quality

Biodiversity and bathing beaches

Biodiversity issues are high on the agenda with a number of species, including water voles, specifically mentioned as in need of protection. Water voles have rapidly declined in across the UK and are now endangered (see p18).

Improved bathing water quality is also a target in order to meet the EU Water Framework Directive, and as a result efforts to reduce diffuse pollution (which is known to affect bathing beaches) will be regarded as a step in the right direction.

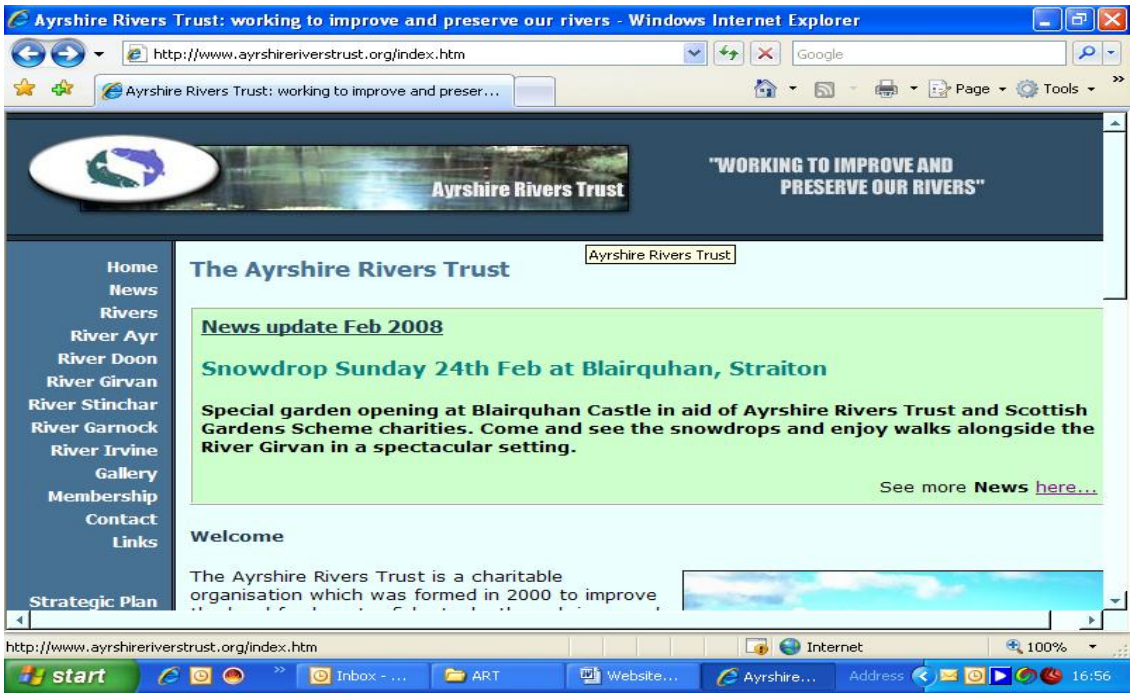
www.ayrshireriverstrust.org

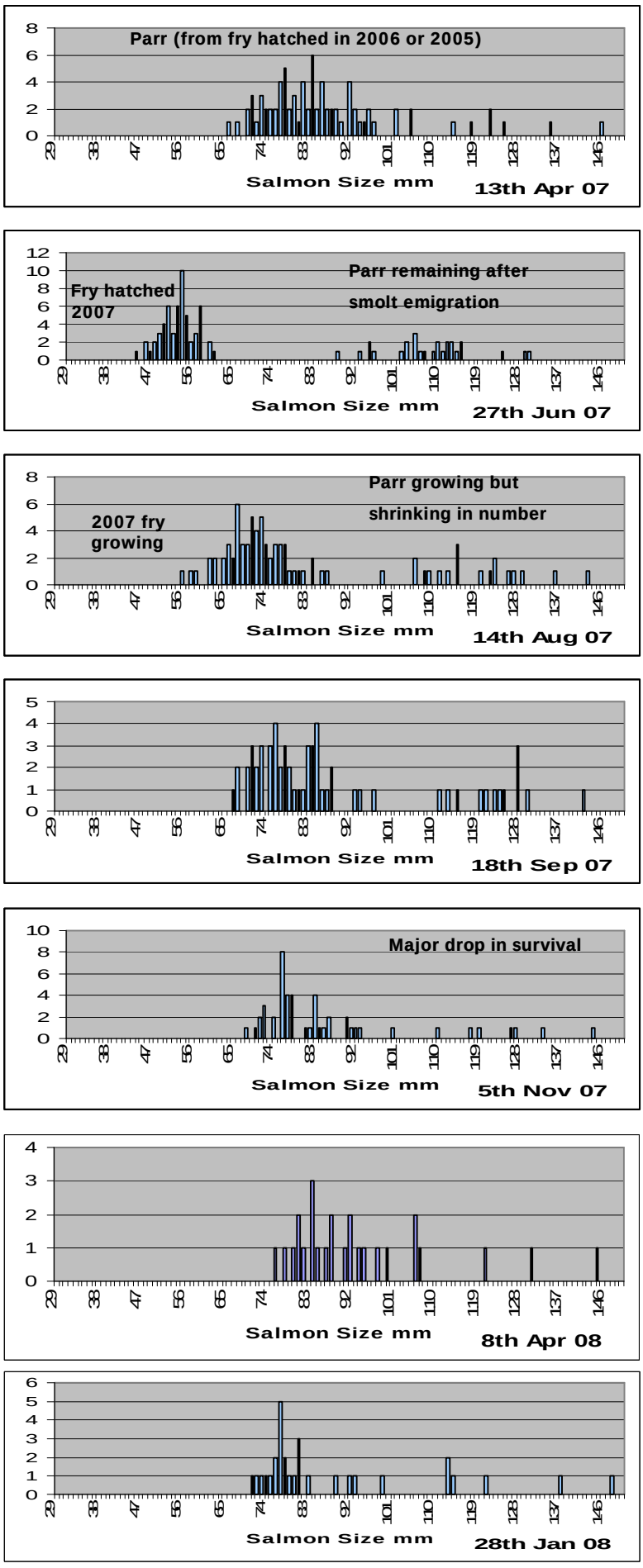
In the age of the internet it is essential to have an effective website. The Trust has put some effort into upgrading its website over the last couple of years, with the help of local computer expert Charles Ellis. The news page on our website is regularly updated – see http://www.ayrshireriverstrust.org/news.htm We have not yet gone as far as posting a daily blog, but news and longer articles covering a variety of topics can be read. Older news items can be found by clicking the news link on the left side of the home page.

We also have an information page for each major river, for example for the River Ayr at: http://www.ayrshireriverstrust.org/ayr.htm where a description of the river's key features is provided. Over the years, the Trust biologists have amassed a huge picture archive of river scenes and features. A selection of these photos can be found in the gallery page (http://www.ayrshireriverstrust.org/Photo%20Gallery/gallery.htm).

There are many other useful links for researchers trying to find out more about rivers in Ayrshire, for instance daily river flow levels and other organisations with similar interests.

The Trust's members are important to us and we work hard at maintaining our membership database. Full details of the benefits available to members can be found at http://www.ayrshireriverstrust.org/membership.htm Also available to download on the same page is the membership application form.





Salmon size distribution, Culroy Burn monitoring site

Salmon growth study

In order to investigate the growth of juvenile salmon, the Trust has begun a project to monitor the salmon population in the Culroy Burn near Minishant (a tributary of the River Doon), in collaboration with Fisheries Research Services (FRS) at Pitlochry.

The study was prompted by discovery of a significant production of one year old smolts, during the 2006 smolt trapping exercise at Dalrymple. The Culroy was selected as it is one of the few lowland burns in central Ayrshire which is capable of supporting an abundant salmon population.

The first survey on the 13th April 07 (top graph) found a good number of salmon parr, many of which were smolting. On the second survey in June large numbers of salmon fry (spawned winter 2006-7) were present. The mean size of the salmon fry found during this survey was 53mm. By August the mean size had grown to 72mm, then 79mm in September and 80mm in November. Thus the majority of growth in the first year occurred by the end of September. Between September and January many fish disappeared, possibly due to an increase in mortality during adverse winter conditions.

By April 2008 the mean size of the same year class was now 92mm. All of the salmon parr over 100mm were showing signs of smolting, i.e. silvering, black tail and fins. Smolts leaving as one-year olds in May would normally be missed by summer electrofishing surveys which begin in June. This will be taken into account in future surveys.

In order to put the salmon size data in context, a datalogger was deployed in the Culroy Burn to record temperatures during the study. The results of the fish growth survey and the datalogger are now with FRS for analysis. The aim of the project at FRS is to develop a growth model which could be used to predict smolt age. Studies such as this may also prove useful by recording how salmon adapt to climate change.

Ayrshire Rivers Trust events 2007 and 2008

Country Fair Sunday 9th June 2007
Skeldon Estate, Dalrymple

Our Annual Country Fair was held at Skeldon Estate near Dalrymple on a gloriously sunny day (one of the few we had!) Main attractions included a couple demonstrations by Skyhigh Falconry's Alan Rothery One falcon decided to take a break and was eventually spotted on one of the chimney pots of Skeldon House, doing a bit of sun-bathing.

The Trust's biologists Brian Shaw and Pete Minting demonstrated their electrofishing skills on the beautiful River Doon which flows through Skeldon Estate, and found salmon, trout, lamprey, minnows, stoneloach, eels and sticklebacks – an impressive haul!

Other attractions included the ever popular Jim Tomlinson, a former World Fly Casting Champion who makes his craft appear deceptively simple and a cross-section through a working beehive displayed by Tony Riome of the Ayr and District Beekeeper's Society. The tea tent with its marvellous home baking provided tired feet with a haven of tranquillity.

In 2008 the Country Fair will be at Skeldon House on Sunday 1st June
Please come along and support us!

Fisherman's Supper Friday 9th November 2007
Cariston Hotel, Ayr

The Fisherman's Supper was a great night was enjoyed by all. The guest speakers were Charles Jardine (right) and Dennis Johnson. Charles Jardine is a well known and respected angler who has written many books on Fly Fishing and also countless articles for fishing magazines.

His presentation was well received by a rapt audience, and accompanied by many witty anecdotes describing his piscatorial adventures. His presence at the Supper was much appreciated by all at the Trust as he travelled all the way from his home in Shropshire by train that day, before making the return journey early the following morning.

Our other speaker, Dennis Johnson, is an Ayrshire-born retired English teacher. His stories of life in and out of school had us rolling with laughter. A lesson in comedy from a real past master! Master of Ceremonies Ian McGregor directed proceedings with his ever humorous take on "the battle of the sexes". Last but by no means least our Head Biologist, Brian Shaw, gave his customary "State of the Ayrshire Rivers" address.

The 2008 Fisherman's Supper is planned for Friday 7th November, at Ayr Racecourse

If you would like to book tickets for this year's Fisherman's Supper please contact Janette Galbraith on 01292 525142 or email: janette@ayrshireriverstrust.org

INCOME AND EXPENDITURE
FOR THE YEAR ENDED 31 JANUARY 2008

	Year to 31 January 2008		Year to 31 January 2007	
	£	£	£	£
Income				
Fund raising (net of direct expenses)				
Dinner auction	-		15532	
Country fair	2802		2235	
Fisherman's supper	71		549	
Raffle	1946		1040	
Merchandising	(30)		-	
Annual report advertising	1500		-	
Sponsored diet	1157		-	
Barbecue	90		-	
Gift Aid tax reclaim	1249		-	
		8785		19356
Membership				
Ordinary	1440		1320	
Corporate	980		800	
Life	440		800	
		2860		2920
Other income				
Donations	3645		7828	
River Board subscriptions (Doon, Girvan, Ayr & Stinchar)	8600		8200	
Grants received	15951		35285	
Consultancy fees	47209		22613	
Interest received	1545		1292	
		76950		75218
		88595		97494
Expenses				
Employment costs	61735		56780	
Trustees' expenses	1500		1500	
Printing, stationery and postage	4094		3324	
Professional fees	1680		2315	
Training fees	464		2261	
Telephone	1626		969	
Motor expenses	5495		5231	
Subsistence	802		1392	
Subscriptions	2571		1984	
Insurance	3021		2036	
Office rent	2618		1060	
Loan interest	100		176	
General expenses	661		417	
Depreciation	4053		5403	
Biologists' equipment	2162		2911	
		92582		87759
(Deficit)/Surplus		(3987)		9735

BALANCE SHEET
AS AT 31 JANUARY 2008

	As at 31 January 2008		As at 31 January 2007	
	£	£	£	£
Fixed Assets				
Motor vehicle	6109		8146	
Equipment	6047		8062	
		12156		16208
Current Assets				
Bank current accounts	3250		940	
High interest bank accounts	42634		49808	
Debtors	7736		2896	
Stock	436		-	
Tax recoverable	-		200	
		54056		53844
Current Liabilities				
Bank term loan for motor vehicle	483		1858	
Accrued charges	5265		3743	
		5748		5601
		60464		64451
Represented by:-				
Accumulated fund brought forward		55251		46316
(Deficit)/Surplus for year		(3987)		9735
Transfer to Life Membership Fund		(440)		(800)
		50824		55251
Life Membership Fund				
Brought forward	9200		8400	
Movement in year	440		800	
Carried forward		9640		9200
		60464		64451

This information is extracted from the Statement of Financial Activities and the Balance Sheet included in the financial statements. The statutory financial statements have been independently examined and the examiners' report was unqualified. Statutory financial statements can be obtained by writing to the charity at the Donald Hendrie Building, Auchincruive, Ayr, KA6 5HW.

Thanks to...

British Trust for
Conservation Volunteers

Whitley Animal Protection Trust

South, East and North Ayrshire Council
Hillhouse Quarry Group Ltd
Scottish Power

Ayr, Doon, Girvan and Stinchar District Salmon Fishery Boards
River Irvine Angling Improvement Association

Dalry Garnock AC	Hurlford & Crooked Holm AC
Carrick AC	Largs & District AC
Kilbirnie AC	Kilmarnock AC
Dreghorn AC	Kirkmichael AC
Colmonell AC and Barr AC	Smithston Fishings
Dailly AC	Galston AC
Ladykirk AC	Darvel AC
Mauchline & Ballochmyle AC	Cumnock & District Angling Association

And to all our private donors, members and friends for their support

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Scottish registered charity No: 030426