

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.”

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Cover photos: Waterfall, Caaf Water (J. Durok), River Garnock. Brown trout (*Salmo trutta*) (James Matthews), Dalmellington Primary pupils (Salmon in the Classroom) (P Minting), Wind turbines, Hadyard Hill, River Girvan (B. Shaw).



Ayrshire Rivers Trust

Chairman's Introduction

Our fifth year was one of both consolidation and moving ahead into new areas of work. Brian Shaw has slotted well into the role of leading and organising the Trust as well as producing innovations. We are indeed lucky to have hard working and dedicated biologists in Brian and Peter who each bring their separate skills to produce a formidable team. They have, for example, completed a record number of electrofishing sites in the past year. They have also secured funding for several new areas of research including invertebrate and sea trout monitoring.

The habitat surveying of all the Ayrshire Rivers is now almost complete, thus allowing Fishery Boards and others who manage fisheries to prioritise remedial work on the rivers. Paisley University student Jozef Durok did an excellent job in completing the River Garnock Habitat Survey. We hope this experience will prove useful to Jozef as he pursues a career in fisheries biology. A few tributaries of the River Irvine remain to be surveyed.

A new area of research in the form of invertebrate sampling has been introduced. This gives a guide to the availability of feeding for fish as well as a guide to water quality. This is relatively innovative work in which other Trusts have shown interest. We also held a workshop for Trust members with an invertebrate specialist and it proved both informative and popular.

Also new to us is the amount of electro-fishing survey work carried out in respect of proposed wind farm sites to monitor the impact on the aquatic environment.

Our educational project – Salmon in the Classroom – has expanded to eleven schools from four in the preceding year. The innovative use of water coolers, normally used in pubs, has ensured excellent survival rates of the salmon. It continues to be highly popular with the schoolchildren involved.

We continue to advise the District Salmon Fishery Boards and others on ways to improve rivers. It is pleasing to note an example of this work carried out in the Muck Water, which appears to have resulted in the doubling of salmon fry and parr numbers in the year since it was completed.

Financially, this last year was “back on track”, with a small surplus in the Income and Expenditure Accounts. George Steel, who has given many years of stalwart work as the Trusts administrator, was made a Trustee during the year. He will continue with his role as Treasurer. It is the intention of the Trustees to appoint a part time administrator, who will be based in the office at Auchincruive.

I find myself repeating that none of our achievements could have taken place without the continued support of our members, donors, helpers and those who have given us grants. We owe our existence to all of you. We raised a magnificent sum of £20,547 at our Auction Dinner which was held at a new venue in The Princess Royal Stand at Ayr Racecourse. Thank you to those who gave us lots, those who bid for them and for the hard working Committee. We also raised £2151 at our Country Fair at a rather damp Barskimming, £838 at our Fisherman's Supper in October and £1370 in our raffle. Many thanks to all involved.

Lastly I would like to pay tribute to our hardworking Trustees who put in a great amount of work and of course to our Biologists who have gone from strength to strength. This report is a fine example of their work and I congratulate them both.

PETER KENNEDY
Chairman

Biologists Summary

2005 was a very productive year for the Trust. A habitat survey of the River Garnock was completed, a significant step towards the Trust's target of evaluating the riparian and instream habitats of Ayrshire's major rivers. The dry weather conditions also allowed the Trust to survey a record number of electrofishing sites.

The Trust was able to carry out habitat and electrofishing surveys in the north of Ayrshire due to funding organised by the River Garnock angling clubs and the River Irvine Angling Improvement Association. The Trust's understanding of fish populations and the factors influencing them has increased significantly in 2005, particularly in the north of the county. The Trust continues to work in partnership with the organisations responsible for the management of fisheries across Ayrshire, local authorities, private landowners and agencies such as SEPA to deliver improvements to the freshwater environment ever possible.

The introduction of invertebrate sampling has added a new dimension to the Trusts survey work and this year led to the Trust discovering an unfortunate sheep dip pollution incident in the upper River Girvan.

In 2006 the Trust will continue to work towards the targets outlined in the Strategic Plan. Projects already started or proposed for 2006 include:

- Expansion and development of the Salmon in the Classroom project
- Smolt trap on the River Doon to assess salmon and sea trout production
- Sea trout post-smolt sea lice sampling
- Development of invertebrate studies at electrofishing sites.

As a result of the varied land uses and landscapes found in Ayrshire, the Trust biologists have to deal with many issues, from the effects of opencast mining and urban development to extensive sheep grazing. For instance, the fast-flowing, rural River Stinchar in the south is a very different river to the semi-urban River Irvine in north-east Ayrshire. This variety results in an interesting and challenging workload.

Electrofishing data 2005

In 2005 ART continued to monitor its core electrofishing sites. Many new sites were also surveyed as part of specific projects. The Rivers Stinchar, Girvan, Doon and Ayr were surveyed in detail, along with the Irvine and Garnock. Funding has limited research on the Irvine and Garnock in the past but fortunately local angling clubs were very active in securing funding for the 2005 research season. Specific surveys were also requested by wind farm developers at two locations (see separate section on Planning Applications).

In 2005 ART carried out electrofishing surveys on main stem sites, where timed surveys were used to assess salmon fry abundance. Juvenile salmonid populations tend to be dominated by salmon in the main river, with trout tending to dominate in the tributaries and headwaters. Surveys were also carried out on smaller tributaries, to generate population density estimates for salmon and trout. The distribution of other freshwater fish species, native and non-native, is also recorded.

The Trust is a member of the Scottish Fisheries Coordination Centre (SFCC), which is an association of Fisheries Trusts, some District Salmon Fishery Boards, FRS Freshwater Laboratory and the Scottish Executive. Established in 1997, the SFCC provides training and operates a national database. ART supplies its standard electrofishing survey data to the SFCC, allowing national comparisons to be made.

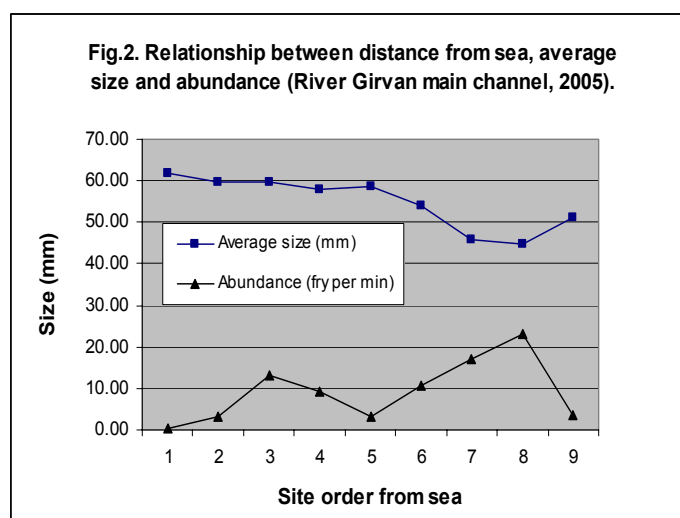
Timed surveys of salmon fry abundance

A large number of main stem sites were surveyed across Ayrshire in 2005 compared to 2004, partly as a result of dry weather and favourable electrofishing conditions (see map on page 6). Comprehensive surveys were completed in all of the major rivers. Collecting information from the same sites on an annual basis is very important to establish trends in population dynamics. The Trust now holds three years of timed survey data for most of the major rivers in Ayrshire.

Geographical trends have now become apparent in the data, with salmon fry abundance consistently high or low at specific locations. Temporal trends also occur, which may be linked to annual variations in river flow and the number of adult salmon returning to spawn.

- Fry numbers were generally higher in 2005 than 2004 and more similar to 2003.
- A figure of five salmon fry per minute is generally considered to indicate a healthy salmon fry population. The River Stinchar and upper Girvan consistently exceed this threshold and the Garnock has also produced some excellent results in 2005. The most productive areas tend to be in the upper river where the gradient and water quality begins to increase. The importance of such areas for salmonid spawning and juvenile production cannot be underestimated.
- The survey results from the Ayr again found good salmon fry densities in the Greenock Water, Glenmuir Water and Guelt Water.
- Salmon fry were found throughout the lower Doon (most sites in the average category).
- The results from the lower Irvine were poor, primarily due to unsuitable habitat quality. Results from the middle reaches of the main stem were better although the many weirs in the upper Irvine will undoubtedly have an impact on migratory fish populations in that part of the catchment.

In 2005 the River Girvan was surveyed in a single day, allowing a comparison between the size distributions of salmon fry in different parts of the river. The decrease in average size until site 8 could be the result of density-dependent competition, which probably has a significant effect in the upper Girvan where habitat is ideal for salmonid spawning. At the uppermost site 9, spawning habitat begins to be limited by bedrock, increasing space available for each fry and consequently their size.



Density estimates on tributary sites

Population density estimates are generated by surveying a measured area of stream. Fry and parr density estimates are produced. Parr rather than fry numbers provide the best indication of recruitment to adult stocks. A similar banding system to that used for timed fry surveys has therefore been produced for parr results on the tributary sites, to give an indication of the productivity of each site. The main difference is that salmon and trout parr densities have been combined to give a total parr density figure for each site. Small tributaries tend to be dominated by trout, although there are many exceptions. The range of values for each classification is shown in Table 1 below.

Table 1: Ayrshire density sites total parr classification

| Total parr (No/100m²) | Classification |
|---|-----------------------|
| 0.0 | Very poor |
| 0.4 – 2.5 | Poor |
| 2.5 – 5.0 | Average |
| 5 – 7.5 | Good |
| 7.5+ | Excellent |

ART monitors many core sites for salmonid population density every year. This information is very useful in terms of identifying sub-catchments which are in need of improvement and those which are consistently productive. Fish populations at individual site will fluctuate from year to year; therefore long-term monitoring is essential if trends in fish populations are to be established.

Electrofishing maps – density estimates

Density sites are shown on the map on page 7 as bar graphs, with salmon in red and trout green. All of the sites surveyed in 2005 are shown on the map. This form of mapping is again useful for showing regional or annual trends. It is important to emphasise that the results from one specific site, although that site will contain a range of habitats, cannot be used in isolation to generate estimates of population density for entire tributaries or rivers. Any drastic changes in the performance of particular tributaries might become apparent using this method, provided there is a dataset available for several years and ideally more than one site for each tributary. Unexpectedly poor results can always be investigated further as they arise. Any major improvements, for instance resulting from improved access for salmon over weirs, will also be identified using this method.

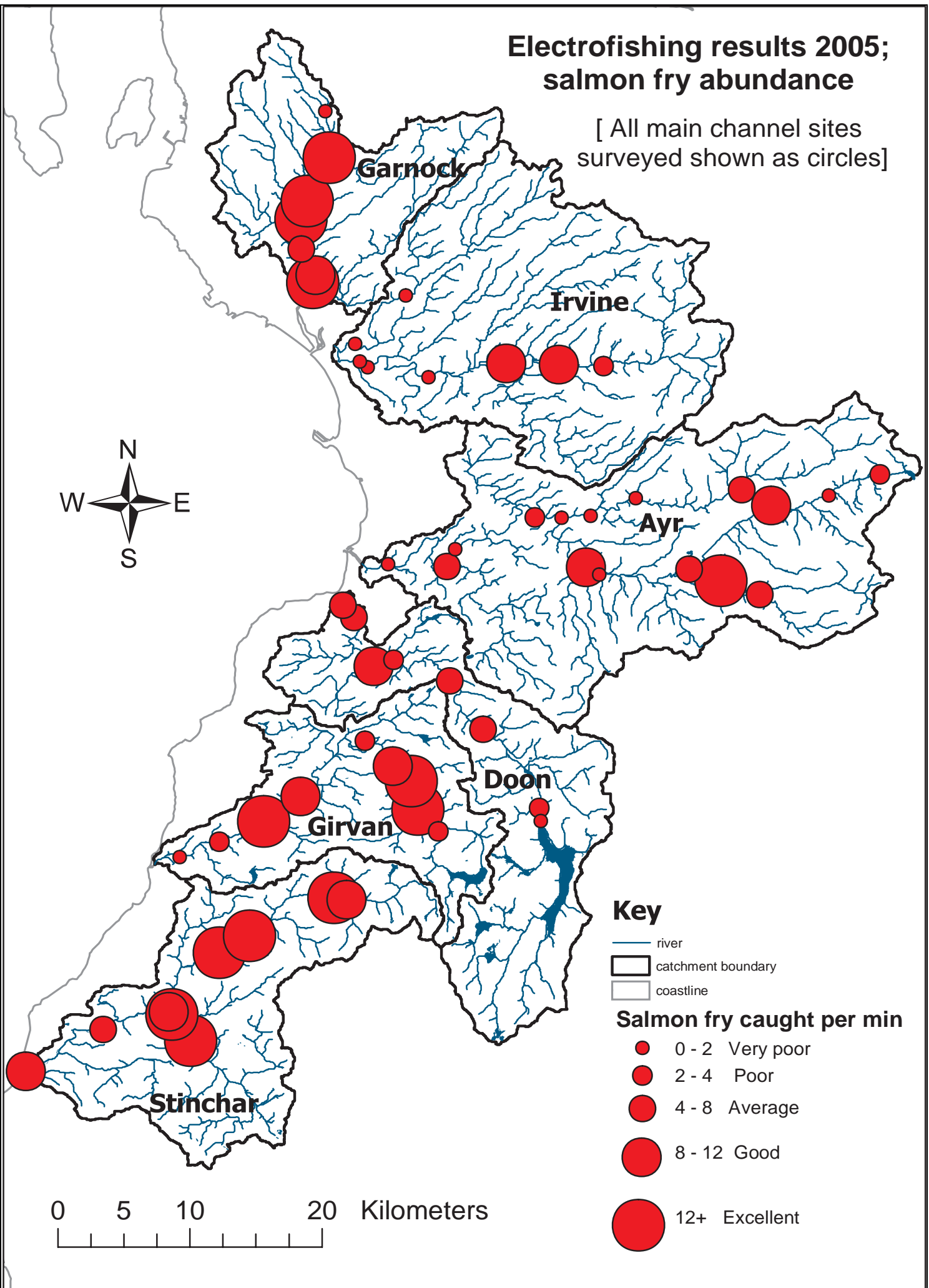
Areas which are generally accessible to migratory fish but have low densities of salmonid fish include the lower Ayr and lower Irvine catchments. In these areas salmonid production is thought to be limited by land use issues such as siltation, over-enrichment and degraded habitat quality.

| River | Top tributary sites for salmon* or trout parr density in 2005 |
|--------------|---|
| Stinchar | Pollgowan and Laggish Burns (Barrhill), Water of Tig (Glenour). |
| Girvan | Lindsayston Burn (Dailly), Lambdoughty and Balbeg Burns (Straiton). |
| Doon | Dunaskin Burn, Muck Water (Dalmellington), Culroy Burn (Minishant). |
| Ayr | Guelt and Glenmuir Waters (Lugar), Water of Coyle (Rankinston). |
| Irvine | Glenoul Burn and Glen Water (Darvel), Hag Burn (Galston). |
| Garnock | Pundeavon and Paduff Burns (Kilbirnie), Dalry Burn (Dalry). |

*Sites highlighted in bold contained more salmon than trout parr.

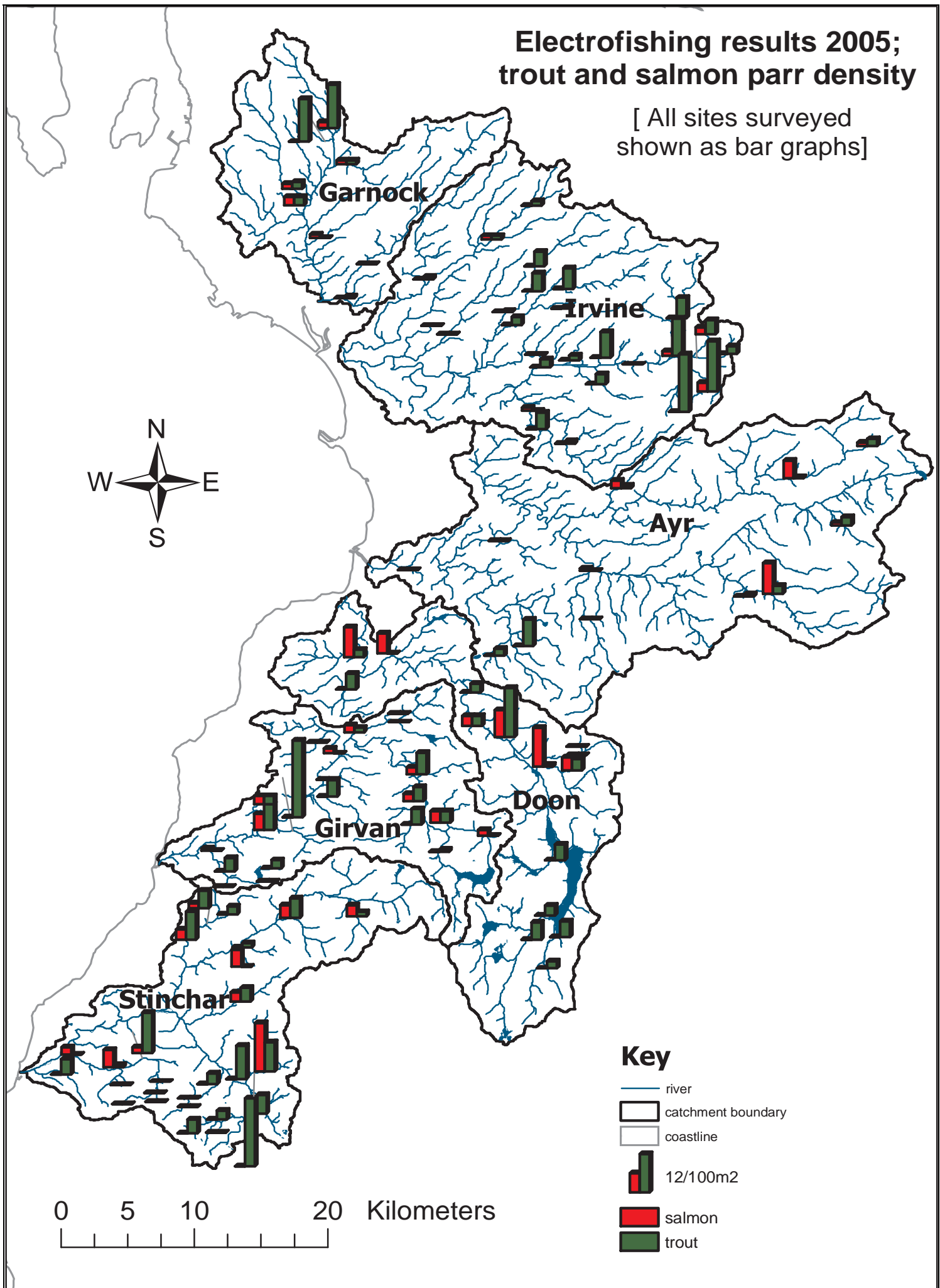
Electrofishing results 2005; salmon fry abundance

[All main channel sites
surveyed shown as circles]



Electrofishing results 2005; trout and salmon parr density

[All sites surveyed
shown as bar graphs]



Consultations

ART biologists spend a considerable amount of time responding to a wide variety of consultations, including local developments and national consultations.

During 2005 ART contributed to the following national consultations:

- **Scottish Executive Aquaculture and Fisheries Bill:** This very comprehensive consultation covered a range of issues from regulation of aquaculture to proposals for restrictions on the number of rods permitted by an individual angler. The consultation provided an opportunity for all interested parties to influence the forthcoming Bill.
- **Fish Farming Code of Good Practice (CoGP):** This consultation sought comments from stakeholders on the content of the proposed industry CoGP.
- **SEPA Controlled Activities Regulations (CAR) Charging Scheme:** The Controlled Activities Regulations, which are part of the implementation of the Water Framework Directive, will herald a radical change in the management of freshwaters and fisheries.

There were also many consultations concerning local issues such as:

- Scoping document from Scottish Coal on a proposed extension to the Chalmerston opencast mine near Patna.
- Laigh Glenmuir opencast mine proposal, near Cumnock.
- Consultation on the River Garnock Flood Alleviation Scheme
- Dalry STAG Assessment: This consultation looked at different options for traffic management in and around Dalry.
- Improvements to road culverts at Loch Doon.

The Trust was consulted on a development proposals for a number of windfarms in the area including, an extension to the Ardrossan windfarm and new developments at Whitelee (Darvel), Dersalloch (Straiton), Kyle (Dalmellington), Kaim Hill (Hunterston), Mark Hill and Arecleoch (both Barrhill).

Planning applications and developments

The Trust was asked to complete electrofishing surveys at the existing Hadyard Hill windfarm site on the River Girvan and proposed Arecleoch windfarm site in 2005. The information collected has been supplied to the companies concerned, Scottish and Southern Energy (Hadyard Hill) and Scottish Power (Arecleoch). The Trust also supplied information to companies involved in proposed windfarm developments at Dersalloch (Straiton) and Mark Hill (Barrhill).

At Hadyard Hill windfarm the Trust surveyed two electrofishing sites on the only burn on the site which averages over 0.5m in width. This supports spawning by trout present in Penwhapple Reservoir. The survey found high densities of trout fry, indicating that spawning success had not been compromised by the project works over the previous winter. Results from other sites surveyed further downstream from the windfarm (on the Penwhapple Burn) also found no evidence of a negative impact. The survey did, however, highlight shortcomings in the site environmental plan, which stated that there would 'almost certainly be no fish within the works area'.



Installation of wind turbines at Hadyard Hill on the Girvan catchment

At Arecleoch 15 sites were surveyed on the Water of Tig and Duisk sub-catchments (to the south of the Stinchar label on the parr density electrofishing map). Few salmonids were found within the proposed windfarm area, most of which consists of densely-planted conifer forestry. The area is fairly inaccessible to migratory salmonids due to waterfalls. Eels, which can climb long steep sections of river, were the most common fish within the site boundary. Some healthy populations of trout were found just outside the site boundary. Many of the tributaries surveyed were heavily silted due to peaty soil and a history of tree felling and soil disturbance. However, further downstream in the Water of Tig and Duisk Water salmon parr densities are high, so it is important that any developments in the Arecleoch area do not have a negative impact on the freshwater environment.

It is suspected that the most likely time for a problem to occur for fish would be during the construction phase, when soil is exposed from the creation of new access roads and heavy vehicles are working onsite. To date, no serious problems for fish have been identified during the construction of windfarms in Ayrshire but the Trust continues to monitor the situation closely and provide construction companies with detailed advice on how to avoid causing problems for wild fish.

Laigh Glenmuir opencast mine

From 2006 Ayrshire Rivers Trust (ART) will be carrying out some detailed monitoring of the Glenmuir Water at Laigh Glenmuir. Planning permission has been granted for an opencast mine on the northern bank of the Glenmuir Water, which is a tributary of the River Ayr on the Lugar sub-catchment.

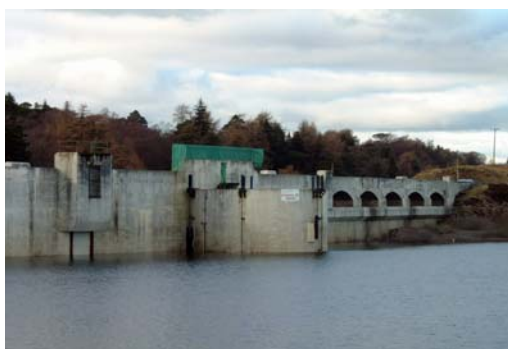
In addition to annual timed electrofishing surveys, the Trust will monitor salmonid densities at three sites, one downstream of a proposed coal conveyor, one downstream of a proposed discharge from settlement lagoons and a third site adjacent to an existing monitoring site just upstream of Glenmuir Bridge. Invertebrate samples will also be taken to monitor any changes in water quality. These sites will be monitored annually until site operations cease and restoration is complete.

The Glenmuir Water and tributaries is a vitally important refuge area in terms of salmonid spawning and juvenile salmon production in the Lugar side of the River Ayr catchment. There has been relatively little development in this area and high salmon fry densities, parr densities and redd counts are consistently found in this area.

Loch Doon fish counter

ART has a contract with Scottish Power to download the fish counter at Loch Doon and report on fish movements. The counter is a resistivity-type model which detects fish by measuring changes in the resistance of water flowing over a section of channel containing the counter electrodes. In theory this could work well if the electrodes are well-sited and fish are forced to swim very close to the electrodes. However, the installation of the counter is sub-optimal so that fish may often leap right over the section of channel containing the electrodes and not be counted. Some types of debris may also generate false counts. Other problems recorded with this type of counter include other animals, such as otters, generating false counts. The only way to validate this counter would be continuous video recording to compare the images with individual counts. This has proven difficult on other similar installations in Scotland. The Trust is now hoping to secure funding for a new fish counter which works in an enclosed section of channel and therefore cannot miss a fish moving upstream or downstream. Images are created of objects passing through this type of counter using infrared technology, so it would also be easier to eliminate false counts and record the size of any fish passing through.

Once fish have swum upstream from the counter at the base of the dam they then need to ascend a spiral fish ladder before entering Loch Doon. The circular fish ladder tower can easily be seen on the upstream face of the dam. On 1st December 2005 the Trust visited the counter and fish ladder tower. On this occasion a dead female salmon was found at the base of the fish ladder, proving that salmon do pass up through the channel containing the fish counter. This salmon had failed to enter Loch Doon, as it had accidentally leapt out of the channel on to the concrete base of the tower. No upstream count was recorded by the fish counter on this day or previous few days, suggesting that the fish had not been counted. The Trust contacted the dam operator Scottish Power and requested screening of the channel and ladder pools. Scottish Power has now put screens in place to prevent such mortalities. Other problems with the design and maintenance of the Loch Doon dam and Galloway Hydro-Electric Scheme have been highlighted by the Trust. These problems are also being examined by the Scottish Executive's sub-committee for Fisheries and Hydroelectric Power.



Fish ladder tower at Loch Doon dam



Dead salmon containing eggs

It is not known whether many salmon enter the Upper Doon above Loch Doon dam. There are many problems for wild fish in the Upper Doon including acidification, obstructions and the effects of forestry. Natural waterfalls also prevent access to many areas. Wild salmon are rarely found in the Upper Doon during electrofishing surveys.

Habitat restoration

The Muck Water is the largest, and in terms of salmonid production, the most important tributary of the River Doon. Downstream of Dalmellington the Muck Water had been dredged in the past, originally to divert the burn to allow for construction of an airstrip. The resultant canalised section of the burn was over widened, shallow and lacked cover for fish other than fry.

The River Doon DSFB provided funds to allow the Trust to install two flow constrictors which were designed to create more flow diversity. Two types of constrictor were used. The upper structure (shown in the photos below) was constructed from large logs which were secured by partly burying the bankside ends, whilst the mid channel ends were notched and pinned. The lower structure (not shown) was made using field boulders to narrow the burn to a more natural width.

The results from the electrofishing survey at the upper flow constrictor are shown in the Table below (fish numbers/100m²)

| Date | Mean width (m) | Salmon fry | Salmon parr | Trout fry | Trout parr |
|----------|----------------|------------|-------------|-----------|------------|
| 08/09/05 | 5.90 | 117 | 13 | 1 | 1 |
| 03/09/04 | 7.98 | 60 | 4 | 1 | 0 |
| 02/09/03 | 6.48 | 62 | 2 | 9 | 1 |

It was very encouraging to see that the density of both salmon fry and parr had increased significantly at the site, compared to previous surveys.



Log flow constrictor on the Muck Water at Craigengillan Bridge, near Dalmellington (low flow)



Same structure during medium flow conditions

Habitat surveying

During 2005 ART completed a habitat survey of the River Garnock with the help of funding from local angling clubs, North Ayrshire Council and Scottish Natural Heritage (SNH). Habitat surveys provide an overview of the main impacts affecting watercourses. As well as identifying problems such as pollution points or obstacles, the positive features of each catchment, such as good fish habitat, key spawning sites and potential habitat improvement sites can be recorded. The focus is mainly on habitat for salmonid fish; however information was collected on other aspects such as public access, to meet the requirements of funding agencies.

Paisley University student Jozef Durok completed the majority of the River Garnock fieldwork and produced an excellent report for distribution to funders and other interested parties. This will be used as a reference for habitat improvement work on the Garnock in the future and to help inform planning decisions with regard to new developments potentially affecting the river.

With a catchment area of 238km² the Garnock is the smallest of the six main rivers in Ayrshire. Its source is in the Renfrewshire hills at Clyde Muirshiel Regional Park, from where it flows southerly for 39km to the shared estuary with the River Irvine. The major tributaries of the River Garnock are: the Caaf Water, Rye Water, Dusk Water, and the Lugton Water. The dominant land uses within the Garnock catchment are agriculture, urban development and water abstraction and supply.



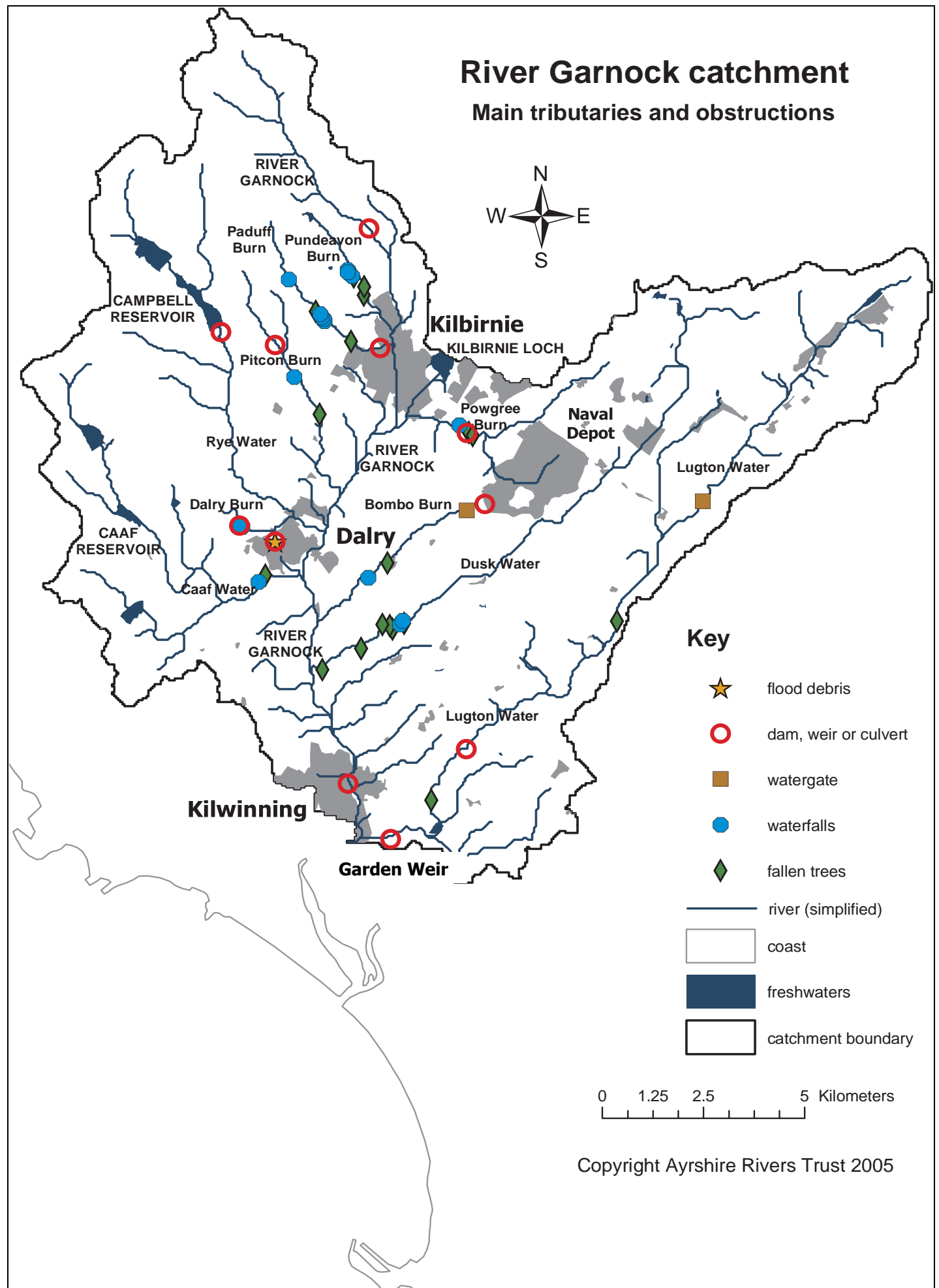
The Garden Weir on the Lugton Water

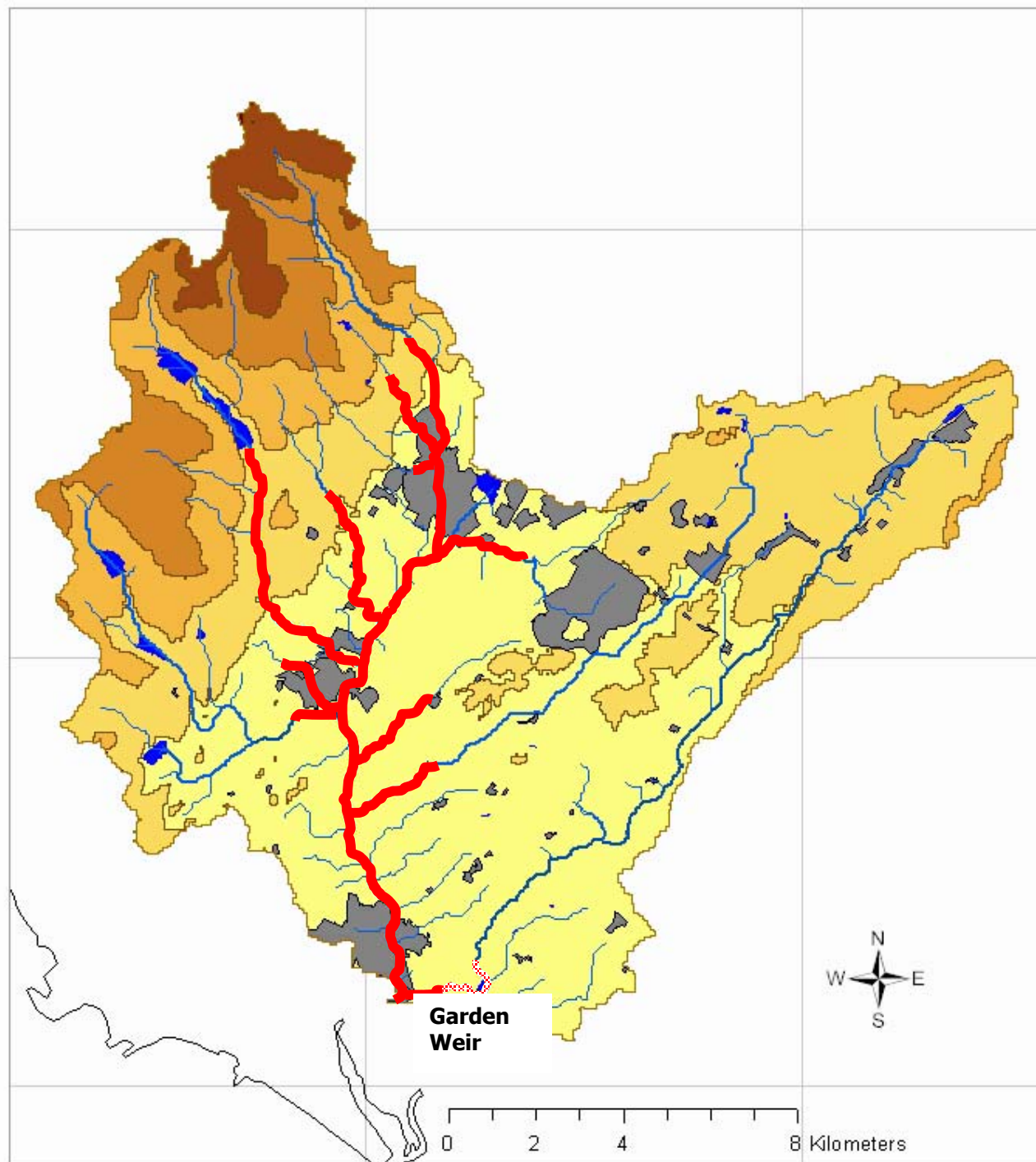
The survey identified many man-made obstacles to fish migration, such as weirs, dams and culverts plus fallen trees and debris blocking several tributaries. On the Lugton Water, our electrofishing survey found a good population of salmon downstream of the Garden Weir, but none in two sites, upstream of the weir (see maps on next two page), representing a significant loss of potential habitat for migratory fish in the largest tributary of the Garnock. Areas of the Garnock catchment considered to be accessible to migratory salmonids are shown in the map on page 14.

In urban areas canalisation has resulted in the loss of habitat and overgrazing has resulted in severe bank erosion on some of the lowland stretches. Despite these problems, the River Garnock has great potential as a salmonid fishery. It has many tributaries which still provide excellent habitat and the diverse geological base and rich agricultural soils combine to form a productive freshwater environment.

River Garnock catchment

Main tributaries and obstructions





River Garnock catchment

 catchment outline

river


stream order

 1

 2

 3


 4

 freshwaters

 urban


altitude

 1 - 100m

 101 - 200m

 201 - 300m


 301 - 400m


 401 - 500m

 501 - 600m

 coast

 10km sq

 Migratory salmonid access

 Intermittent access

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Salmon in the Classroom



Dalmellington pupils releasing their fish on a tributary of the River Doon

This popular educational project begins with an afternoon lesson to primary school classes on local rivers, including threats to wildlife such as pollution, habitat loss and over-fishing. The salmon life cycle is then covered in detail including breeding behaviour and migration. After advice on how to look after salmon eggs, the class is provided with an aquarium containing around 100 salmon eggs.

For the second year the aquaria have been fitted with automatic coolers, to cope with high classroom temperatures. Ayrshire Rivers Trust has pioneered the use of automatic coolers for Salmon in the Classroom (SITC) in Scotland. The coolers ensure a high survival rate and allow the children to see the development of the fish for longer before they are released. Several other Trusts are now considering using this system. Eggs have been supplied by local hatcheries approved by District Salmon Fishery Boards using only native salmon. The children help release the fish back into their local river in late March and visit the river again in summer to do fieldwork.

Ten schools and the Dolphin House Education Centre at Culzean Country Park are involved in the project this year. One secondary school, Mainholm Academy, is taking part along with nine primaries – Ballantrae, Dailly, Crosshill, Kirkmichael, Maidens, Fisherton, Monkton, Logan and Lainshaw. In 2005 the project was completed at four Ayrshire primary schools, so 2006 represents a major expansion.

The majority of funding for the expansion of SITC has been provided by the Big Lottery Fund's Fairshare Trust. The Fairshare Trust is funding 5 schools in the Maybole area for three years, plus two youth groups. Scottish Natural Heritage has helped fund the SITC project at four other primary schools and the British Trust for Conservation Volunteers has funded Mainholm Academy. The Trust aims to run the project on at least one school on each major river every year. Peter Minting has again been running the project in 2006, with the help of senior biologist Brian Shaw. For information on how to participate in the project please contact Trust biologist Peter Minting on 01292 525142.

Atlantic Salmon Arc Project (ASAP)

Ayrshire Rivers Trust has finished coordinating the collection of genetic samples from the west coast of Scotland for the Atlantic Salmon Arc Project (ASAP). ASAP, which is funded by the European Union, includes research partners from England, Ireland, Wales, Scotland and Spain. In the UK the lead partner is Westcountry Rivers Trust, with the project managed by Dylan Bright. By collecting and analysing genetic samples from wild salmon in these countries the project partners hope to find out more about genetic variation between stocks.

Nine fisheries trusts from the west coast of Scotland, including Ayrshire Rivers Trust, provided samples from their local rivers. These Scottish samples have now been delivered to scientists at Exeter University who will complete the analysis. A total of 2309 samples were collected from rivers on Scotland's west coast in 2004 and 2005. A non-lethal technique was used with small fin-clips taken from each salmon parr or smolt caught and then released during electrofishing surveys.

The genetic analysis should be completed by the end of 2006 and Exeter University scientist Andrew Griffiths hopes to publish preliminary results in spring 2007. The idea is to find genetic markers showing clear differences between sub-populations which have arisen on a timescale of a few thousand years.

It is not yet known whether the results will reveal the success or failure of stocking projects involving the movement of salmon between catchments, although this is a possibility. Several scientists are now working on salmon genetics, with clear differences already discovered between western and eastern Atlantic salmon. Exeter University scientists have discussed the use of particular genetic markers with other scientists in this field, for instance Eric Verspoor of Fisheries Research Services (FRS) in order to coordinate research efforts and establish a range of suitable genetic markers. The ASAP project should ultimately result in a marked improvement in the understanding of the genetic composition of wild salmon stocks in Scotland.

Sea trout research

New project in 2005 - sea lice counts

In May 2005 the Trust made a successful bid for funding from the Tripartite Working Group (TWG) to carry out a survey of sea lice levels on sea trout in Ayrshire and Arran. This information could then be used to inform discussion on the formation of an Arran Area Management Agreement. These Agreements are already used elsewhere in Scotland to help control the production of sea lice by salmon farms and theoretically limit the impact of sea lice on wild fish.

Background

After migrating to sea, most sea trout smolts spend at least three months feeding before returning to freshwater in July or August. These 'post-smolts' are then locally known as whitling (or finnock) and are typically around 25cm or 10in in length. Others remain at sea for longer and don't return to freshwater until the following year as 35cm+ sea trout of 0.5kg (1lb)+. However, research completed across north-west Scotland suggests that a

sea trout is more likely to return to freshwater if it accumulates a large number of sea lice. Sea lice graze on the skin of the fish, so it is possible that the fish return early to try and avoid the lice which only live in marine conditions and drop off when the fish return to freshwater. Post-smolts with more than 20 sea lice may die as a result of skin irritation and secondary infections. Early returning behaviour is most common among post-smolts (often with a high sea lice burden) in close proximity to salmon farms. The sea trout population could therefore be seriously reduced by high numbers of sea lice present in the marine environment.

The survey work involved sweep netting estuaries and adjacent sea pools of the Rivers Doon, Stinchar and several smaller rivers on Arran. The closest salmon farm to Ayrshire is on Arran at Lamlash Bay. Any sea trout caught were anaesthetised, measured and lice levels recorded. Evidence of predation was also noted.

In 2005 no sea trout smolts were caught in the estuaries of the Doon or Stinchar, but a significant number were caught at one site on Arran. It is difficult to make conclusions when no sea trout smolts are caught; there may be few early returning smolts or the river may be producing few sea trout smolts. Sweep netting for sea trout smolts improves with practice to find the best locations and tidal conditions.

On Arran twenty sea trout smolts were caught at the mouth of the River Machrie. Sea lice were recorded on 50% of the fish captured, and the average number of lice on infected fish was 4.6. Research on Atlantic salmon post-smolts in Norway found an infestation level of 11.3 lice per fish to be detrimental. Sea trout smolts are slightly larger than salmon smolts, so the threshold may be slightly higher. The level of 4.6 found on the Machrie sea trout smolts is not thought likely to cause serious harm.

More research is needed before any conclusions can be drawn. The Machrie Burn is on the west coast of Arran and the salmon farm is on the east. The distribution of sea lice in the sea around Arran is unknown and the levels seen on the Machrie sea trout may or may not be natural. The estuary of the stream nearest to the salmon farm (Ben Lister Burn) was surveyed but unfortunately no smolts were caught. In 2006 netting will continue and it is hoped that more locations will be successful.



Sea trout smolt with avian predator damage

Of the twenty sea trout post-smolts captured at Machrie, three showed evidence of damage caused by predatory birds. An example is shown in the photo (left). The impact of avian predators on salmonid production is difficult to quantify, but may be significant at certain times of the year.

New project in 2006 - Smolt trap on the Doon

In 2006 the Trust is planning to set up a smolt trap on the River Doon at Dalrymple. This will be used to assess the smolt production by the River Doon upstream of this point and work out the proportion of sea trout smolts relative to salmon. This may provide more clues about the cause of the sea trout decline in Ayrshire. At present the nearest similar projects in Scotland are on the River Bladnoch (Wigtownshire) and Loch Awe, so this project will help to fill a significant gap.

Training

During 2005 Brian Shaw and Jozef Durok attended the Scottish Fisheries Coordination Centre (SFCC) Habitat Surveying course held in Newton Stewart. Brian Shaw also completed the SFCC Introductory Electrofishing Course and Peter Minting completed the SFCC Team Leader Electrofishing Course.

Disease testing

In 2005, Kate Douglas of Fisheries Research Services (FRS) took samples from 30 salmon parr collected from the River Ayr, as part of a government programme of disease testing. In 2004 samples were taken from the River Girvan. Both sets of results gave the fish a clean bill of health.

Events

Ayr Agricultural Show

There were many visitors to the ART stand at the Ayr Agricultural Show. Farmers attending the show were helped with advice on protecting watercourses and where appropriate, referred to the Farming and Wildlife Advisory Group (FWAG). FWAG can help farmers secure funds for protecting water margins as part of a Rural Stewardship Scheme (RSS). The Trust would again like to thank Donalds Surveyors for their generous sponsorship of the ART stand in 2005.

Fundraising events

In 2005 ART held three main fundraising events, the Auction dinner (10th June) Barskimming Country Fair (19th June), and Fisherman's Supper (21st October).

The Auction Dinner raised a very significant contribution of £20,500 towards Trust funds. The new venue of Ayr Racecourse's Princess Royal stand proved popular, with guests able to enjoy views from the balcony on a beautiful evening. We are grateful to both the hard working committee and the staff at Blairquhan Estate office who made the event such a success.

Dismal weather hampered the success of Barskimming in 2005 but plenty of visitors helped raise £2,100. Alan Rothery's falconry display was as popular as ever and visitors enjoyed scenic walks alongside the River Ayr at Barskimming gorge. We are again grateful to the Galbraith family for allowing us to hold the event on the estate.



At Barskimming Trust Chairman Peter Kennedy (left) received a cheque for £1365 from Carlos van Heddegem (right), on behalf of the River Doon Angling Improvement Association. The Association has now closed.

The money will be used to help fund new research on sea trout and salmon smolt production on the River Doon in 2006.

Invertebrate workshop

In April 2005 the Trust organised an invertebrate workshop for Trust members. The workshop was hosted by invertebrate specialist Craig Macadam, of the Ephemeroptera Recording Service. Samples were collected from the main stem of the Ayr and Doon as well as the Culroy Burn. The samples were analysed using the Riverfly Partnership methodology, which has been recently developed by a group of invertebrate specialists including scientists from the Environment Agency and English Nature.



Invertebrate sampling on the River Ayr

During the workshop an interesting find was made in the River Doon where an abundant population of saucer bugs (*Aphelocheirus aestivalis*) was found. The saucer bug, which belongs to the order *Hemiptera*, has only been recorded from 6 other catchments in Scotland and is more commonly found in rivers in southern England.

Local naturalists will be more familiar with another member of this order; *Corixa*, the lesser waterboatman.

Invertebrate monitoring

The methodology introduced by the Riverfly Partnership was used by ART to sample invertebrate populations at each electrofishing site. Invertebrate samples provide a good indication of water quality, not only at the time of sampling but also over an extended period prior to the sampling.

The information collected in 2005 has already been extremely useful in terms of identifying pollution sources and building up a general picture of water quality across Ayrshire. The data can be compared and contrasted with that collected by the Scottish Environmental Protection Agency (SEPA). The Trust's comprehensive network of electrofishing sites means that pollution incidents are less likely to be overlooked and more action should be taken to combat pollution. It may also be possible to find direct links between the status of invertebrate and fish populations. Few Trusts record invertebrate data but results found by ART in 2005 show the value of this work.

At each site a three minute kick sample was taken using a standard invertebrate hand sampling net. The net is held in position downstream of the person sampling, who then shuffles their feet vigorously to disturb the substrate. Any invertebrates dislodged are carried by the current into the net. All the habitat types present in the site should be sampled. The invertebrates present are identified to taxonomic group level (see Table 2) and an estimate of abundance of abundance recorded. All results were entered in a database and a scoring system was developed to rank each site, reflecting invertebrate diversity and abundance.

The invertebrate scoring system has two components, with a letter from A to D for diversity and a number from 1 to 5 to represent abundance. A1 is the best possible score, with high diversity and abundance, and D5 the worst with low diversity and low abundance. Scores such as B4 are often found in upland areas with good water quality but

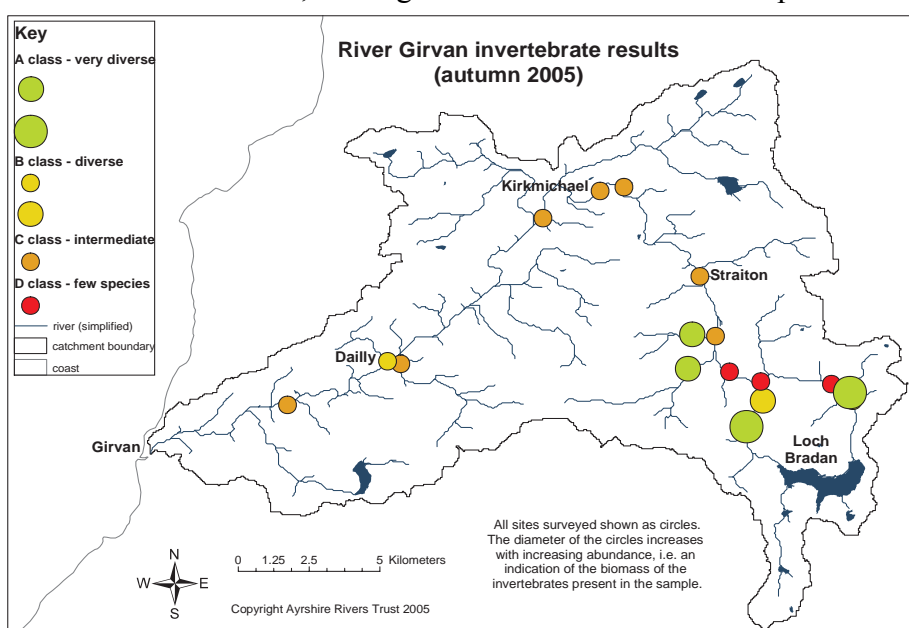
low productivity. Some aquatic animals are assigned higher scores than others, depending on their need for clean water (see below). Stoneflies and heptageniid mayflies require high quality unpolluted water and are assigned the highest score.

Table 2: Scores assigned to each invertebrate group for the ART scoring system.

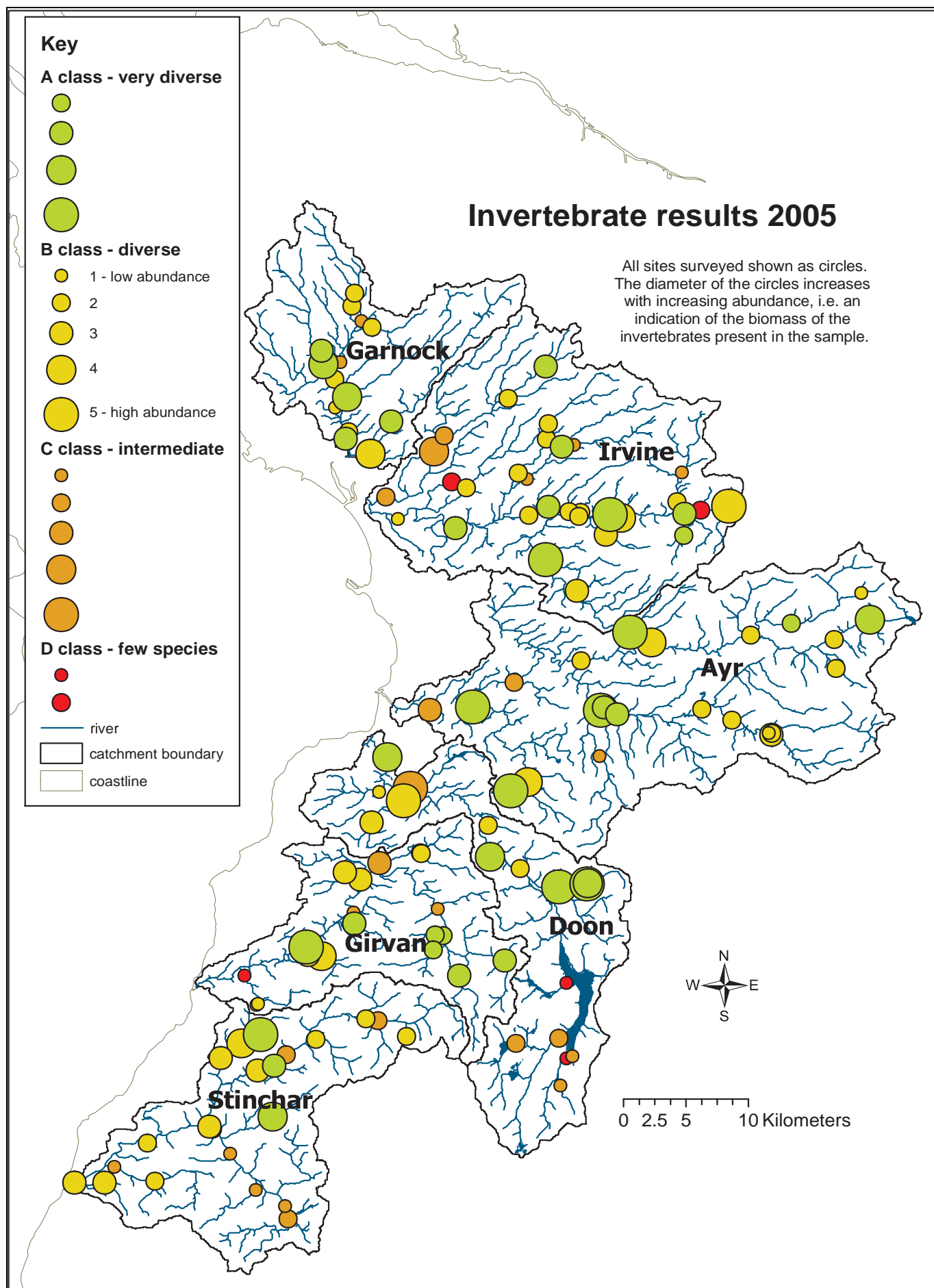
| Group | Score | Group | Score |
|-----------------------------------|-------|-------------------|-------|
| Stoneflies | 10 | Freshwater shrimp | 6 |
| Cased caddis | 9.5 | Snails | 3 |
| Caseless caddis | 7 | Leeches | 3 |
| Mayflies (<i>Baetidae</i>) | 4 | Water hoglouse | 1 |
| Mayflies (<i>Heptageniidae</i>) | 10 | | |

The results for Ayrshire in summer 2005 are shown on the following page. A ‘traffic light’ system has been used to display the results, with the best sites shown by a large green circle and the worst (least diverse, least productive) shown as a small red circle. The red circles in the Loch Doon area highlight the negative effects of acidification and forestry. The watercourses in this area are subject to episodes of low pH and only acid tolerant species of invertebrates are found. Groups such as freshwater shrimps, baetid and heptageniid mayflies are very sensitive to acid conditions and are absent in many of the upper Doon tributaries. The red circles in the River Irvine catchment are probably the result of organic enrichment of surface waters. This can result in a low diversity but high abundance.

The results shown below relate to a specific study on the River Girvan in autumn 2005. Whilst collecting samples for a separate project on salmon genetics (ASAP) surprisingly few fish were found in a stretch of the upper River Girvan. The invertebrate sample results found a striking contrast in the invertebrate population between the main River Girvan and its tributaries. The cause was found to be due to an accidental discharge of sheep dip from a dipping pen on the upper Girvan. This shows the value of completing invertebrate work in terms of identifying pollution sources and assessing their impact. Although sheep dip is unlikely to directly kill fish, the food resource is destroyed and fish may move out of the area until it is re-colonised by invertebrates. The sale of cypermethrin-based sheep dip is now banned in the UK, although it is uncertain if the ban is permanent.



**Evidence of
sheep dip
pollution, upper
River Girvan
2005**



Meetings from January 2005 - January 2006

Glasgow Science Centre

Pete Minting visited the launch day of the Clyde Foundation's educational project at Glasgow Science Centre on 26th January. Similar to Salmon in the Classroom, the Clyde project is run on a much larger scale with around 35 schools participating each year. Trout eggs are used in this project instead of salmon eggs. The Clyde Foundation is able to make use of the Glasgow Science Centre to centralise elements of the project. Caroline McGillivray and Willie Yeomans of the Clyde Foundation helpfully provided the Trust with some useful information on running school projects.

Catrine Community Trust

The biologists attended a meeting in Catrine organised by East Ayrshire Council on February 8th. The Catrine Community Trust (formerly Catrine Voes Trust) will act as a vehicle for the implementation of plans to regenerate parts of Catrine, if a £3M Heritage Lottery Fund bid by the council is successful. The regeneration scheme should include renovation of the Catrine Voes (a disused Victorian industrial mill, including a mill lade and series of ponds) and the provision of a visitor centre. Ayrshire Rivers Trust hopes to remain closely involved with the project and help ensure fisheries interests are taken into account. The regeneration scheme may include a new fish pass, counter and public information on river wildlife at the visitor centre.

Autumn events

Biologist Peter Minting helped judge the Girvan Camera Club's annual photographic competition on 18th October. The club's special subject in 2005 was the River Girvan. In October the Trust also gave talks to the National Trust's Member Centre Group in Ayr and the Girvan Natural History and Geology Society. The Trust is able to give talks to other organisations with an interest in river conservation, for details please contact tel: 01292 525142.

Ayrshire Rivers Trust AGM

The Trust held its AGM at Ayr Rugby Club on 26th September. The Trust biologists gave talks on the recent work of the Trust, following an introduction by Chairman Peter Kennedy. Topics covered included electrofishing results, an update on habitat surveying and ongoing Trust projects.

Tweed meeting

Brian Shaw and Peter Minting both visited the Tweed Foundation on 27th November, to learn more about the design and operation of instream traps used for fish monitoring. The Tweed Foundation operates traps on several tributaries of the River Tweed. Biologist Ronald Campbell provided the Trust with some useful hints on how to operate fish traps and make use of the information collected.

Freshwater Fisheries Forum

The Trust Chairman attended two meetings of the Fisheries Forum where a range of issues pertaining to the management of fisheries in Scotland were discussed.

Wild Trout Trust

Brian Shaw attended an open day held by the Wild Trout Trust on 28 June, where the Tweed Foundation launched its Trout and Grayling Initiative. The day also included a demonstration of electrofishing and habitat restoration techniques.

Local angling clubs

During the course of the year the biologists gave presentations to a number of local angling clubs, where issues such as the Trust's electrofishing and habitat survey work and habitat restoration were discussed.

South Ayrshire Council

Brian Shaw attended a meeting of the South Ayrshire Council Rural Communities Fund in regard to a funding application for an enhancement project on the River Girvan. The Committee awarded ART a grant of £10,000, subject to securing the balance of project costs from other funding organisations.

Controlled Activities Regulations (CAR)

The Trust attended a meeting in Dunkeld where the implications of the forthcoming CAR and river engineering works were discussed.

District Salmon Fisheries Boards (DSFBs)

A key function of the Trust is to collect data on fish populations, habitat quality, etc. and to provide scientific advice to the four DSFB's within Ayrshire. The Trust biologists produce scientific reports and provide advice to the river boards. The Trust biologist's presented detailed reports at all DSFB board meetings this year. At the River Girvan AGM biologist Brian Shaw gave a presentation of the Trust's electrofishing and invertebrate survey work on the Girvan.

Rivers and Fisheries Trusts of Scotland (RAFTS)/SFCC

During the course of the year the biologists participated in several meetings and seminars held by the above organisations. Attendance at these meetings provides a good forum for biologists to discuss issues, but also to meet with the staff from FRS where the latest research results were presented.

Unwanted!

Please let us know if you have seen a signal crayfish anywhere in Ayrshire. These small, freshwater crustaceans have been introduced to the UK from North America. They carry crayfish plague, which is killing stocks of the native white-clawed crayfish in England and Wales. They are also voracious feeders, with the potential to cause serious harm to fish populations. Signal crayfish are now in the River Clyde and Galloway Dee and the Trust is concerned that they could spread to Ayrshire. It is an offence to release non-native species into the wild without a licence. If you know of anyone keeping these animals in Ayrshire please contact the Trust immediately.



*Signal crayfish,
Pacifastacus leniusculus
(Photo by Nisikawa Usio,
University of Otago)*

Media

The Trust website is www.ayrshirerivertrust.org Trust members and supporters should monitor the website for news and features of interest. The Trust's work featured in a number of publications. The Ayrshire Post, Cumnock Chronicle and Carrick Gazette covered the Salmon in the Classroom project

What services can the Trust provide?

The Trust is able to provide advice on most issues relating to the freshwater environment e.g. during 2005 the biologists investigated reports of high mortality levels in a sticklebacks population, which was found to be caused by parasitic infestation. Another instance involved high mortality amongst toads at spawning time, which was due to predation. If the Trust biologists do not have the expertise to advise on any particular issue they are able to tap into a vast reservoir of knowledge and experience within the fishery trust network or organisations such as FRS and the Atlantic Salmon Trust.

The biologists are also able to conduct fishery advisory visits, where potential bottlenecks in fishery productivity can be discussed, e.g. lack of, or poor quality spawning grounds or lack of parr habitat. A limited number of talks on local river wildlife and the work of the Trust can be given to local organisations each year.

Anglers may also be interested in our free scale reading service. Note that it is NOT recommended that scale samples are taken from angled fish that are to be returned to the water alive – these fish should receive only minimal handling. Samples from rod-caught salmon, brown trout, sea trout, grayling, perch, pike and Arctic char are requested. Scales can be analysed by the Trust to determine the time the fish has spent at sea and in freshwater. Free scale packets are available.



Winter scene at Blairquhan Linn waterfall, by Lyn Cuthbertson. *This was the winning slide in Girvan Camera Club's 2005 photographic competition.*

Accounts for the year to 31st Jan 2006.

The £2615 surplus of income is a welcome improvement from the £19,221 deficit in the previous year. This was brought about by a 55% increase in income to £83,955 compared to an 11% increase in expenditure. Income benefited from a substantial increase of nearly £20,000 in grants, although some £10,000 is related mainly to work in the previous year. Consultancy fees are shown separately and at over £8,000 are a welcome addition, generated largely by consultancy work relating to wind farms. The £5,000 increase in income from the Dinner Auction is a credit to all involved. The acquisition of a small van has caused motor expenses and depreciation to rise and the new charity regulations, following the formation of OSCAR, has led to increases in professional fees. The balance sheet remains reasonably healthy but cash reserves at £38,452 were lower than the £44,085 of the previous year.

| INCOME AND EXPENDITURE | FOR THE YEAR ENDED 31 JANUARY 2006 | | | |
|---|---|--------|-------------|---------|
| | 2006 | | 2005 | |
| <u>Income</u> | £ | £ | £ | £ |
| Fund Raising | | | | |
| Dinner Auction | 20,547 | | 14,699 | |
| Garden Fair | 2,151 | | 3,818 | |
| Fisherman's Supper | 838 | | 578 | |
| Raffle | 1,370 | | 1,768 | |
| | | 24,906 | | 20,863 |
| Membership | | | | |
| Ordinary | 1,245 | | 1,720 | |
| Corporate | 400 | | 500 | |
| Life | 200 | | 200 | |
| | | 1,845 | | 2,420 |
| Other income | | | | |
| Donations | 5,330 | | 5,725 | |
| River Board subscriptions, Ayr, Doon, Girvan & Stinchar | 7,700 | | 6,500 | |
| Other income from River Boards | - | | 2,200 | |
| Grants received | 33,964 | | 14,318 | |
| Consultancy fees | 8,740 | | | |
| Tax Reclaimed | 216 | | 356 | |
| Interest Received | 1,254 | | 1,743 | |
| | | 57,204 | | 30,842 |
| | | 83,955 | | 54,125 |
| Expenses | | | | |
| Employment costs | 51,704 | | 48,337 | |
| Recruitment costs | 0 | | 699 | |
| Printing ,stationery & postage | 3,951 | | 3,773 | |
| Professional Fees | 4,424 | | 2,063 | |
| Training fees | 1,378 | | 1,472 | |
| Telephone | 797 | | 687 | |
| Motor expenses | 6,822 | | 5,148 | |
| Subsistence | 509 | | 884 | |
| Subscriptions | 1,925 | | 1,965 | |
| Insurance | 1,708 | | 1,619 | |
| Office Rent | 1,253 | | 1,200 | |
| Loan interest | 235 | | 258 | |
| General expenses | 93 | | 592 | |
| Depreciation | 5,607 | | 3,875 | |
| Biologists Equipment | 934 | | 774 | |
| | | 81,340 | | 73,346 |
| SURPLUS/(DEFICIT) | | 2,615 | | -19,221 |

**AYRSHIRE RIVERS TRUST
BALANCE SHEET**

AS AT 31 JANUARY 2006

| | 2006 | | 2005 | |
|----------------------------------|---------------|---------------|----------------|---------------|
| | £ | £ | £ | £ |
| Fixed Assets | | | | |
| | 10,86 | | | |
| Motor Vehicle | 2 | | 6,643 | |
| Equipment | 5,960 | | 4,984 | |
| | | 16,822 | | 11,627 |
| Current Assets | | | | |
| Bank current a/c's | 803 | | 205 | |
| | 37,64 | | | |
| High interest bank a/c's | 9 | | 43,880 | |
| Debtors | 6,975 | | 900 | |
| Tax recoverable | 200 | | 853 | |
| | | 45,627 | | 45,838 |
| Current Liabilities | | | | |
| Bank term loan for Motor Vehicle | 3,158 | | 2,339 | |
| Accrued charges | 4,575 | | 3,025 | |
| | | 7,733 | | 5,364 |
| | | 54,716 | | 52,101 |
| Represented By: | | | | |
| Accumulated funds b/fwd | 43,901 | | 63,322 | |
| Surplus/(deficit) for year | 2,415 | | -19,421 | |
| | 46,316 | | 43,901 | |
| Life Membership Fund | | | | |
| B/fwd | 8,200 | | 8,000 | |
| Movement in year | 200 | | 200 | |
| C/fwd | 8,400 | | 8,200 | |
| | 54,716 | | 52,101 | |

This information is a summary of the statement of financial activities and the balance sheet derived from 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.