



Progress to date

The Atlantic Aquatic Resource Conservation (AARC) project in the Shannon is rapidly coming to a close. Excellent progress has been made in achieving the objectives set out in the project application in 2010. Of particular success was the establishment of relative survival studies in the River Suck to assess the quality of the Shannon (Parteen) hatchery strain for salmon restoration, using the progeny of salmon sourced from several neighbouring wild populations. As reported in the last newsletter (June 2011) the eggs were transferred from ESB's Parteen Hatchery to two streams on the River Suck, namely the Bunowen and Tirur tributaries. Monitoring of the relative performance in the wild of the various candidate populations continued with a survey of salmon fry at the experimental sites using electro-fishing. These surveys were carried out to determine the densities of salmon fry in the rivers and to assess the relative survivals of the different introduced populations. The egg to summer parr survivals were 1% and 1.5% for the Tirur and Bunowen rivers, respectively, which was not brilliant and probably reflected high initial stocking densities. As described in previous issues, because we have genetically profiled the parent fish, we can assign the recaptured fry to a particular family and subsequently to a specific source population. The genetic assignment work is ongoing and will be reported in the next newsletter. Samples were collected also for body size and shape measurement on the basis that it might help to explain some of the difference in survival that

The current AARC project is due to finish in Dec 2012. To date Shannon AARC has successfully established relative survival studies on the River Suck for progeny of salmon collected from rivers in the lower Shannon and from the ESB Hatchery at Parteen. The results of the genetic assignment to the various populations are expected in November 2012.

may emerge. We had an expectation that the experiment would end with the smolt migration from the experimental streams in the Spring of 2013, however, much to the surprise of the project scientists, a



substantial smolt run of 1-year old fish took place in 2011! This could reflect an adaptive behaviour for early migration or be triggered by environmental factors, such as food availability. Either way, these samples were collected for genetic profiling and parentage assignment. The fish were trapped using rotary screw traps (thanks to ESB and the Marine Institute for the use of the traps). By early 2012 another significant milestone in the project was the installation of a Passive Integrated Transponder (PIT) tag array in the River Bunowen at Clonbrock Demesne. This equipment enables the absolute monitoring of all tagged individuals and the timing of their migrations.

Significant progress has also been made on the compilation of Shannon specific geographical data into GIS. This database will include all AARC project survey data including: the distribution of potential spawning habitats (an essential element in determining restoration possibilities in the system); electrofishing survey results; water quality layers; arterial drainage; barriers data; restocking sites. This mapping tool will enable the presentation and communication of relevant survey data, and will help inform management decisions relating to Shannon salmon conservation.

Other milestones in the project include:

- Consultation and information dissemination to all stakeholders (seminars, newsletters)
- Complete salmonid spawning habitat surveys for the River Suck catchment (using kayaks and on foot)
- Morphometric analysis for all salmon sampled during electrofishing and trapping programmes on the Bunowen and Tirur
- Genetic analysis of archive and contemporary tissue and scale samples from the Shannon

Installation of the PIT tag array

The Biomark® PIT tag monitoring system was established at the Clonbrock site, on the Bunowen river, in County Galway Ireland, as part of the Atlantic Aquatic Resource Conservation (AARC) project. The Irish partners in the project include Inland Fisheries Ireland (IFI), University College Cork (UCC), ESB Fisheries and the Marine Institute (MI).

Atlantic salmon eggs were collected from populations located in five different rivers from around the River Shannon and introduced into the Bunowen river, a tributary of the upper Shannon, as part of relative survival experiments, using DNA profiling techniques. Genetic tagging allows fish collected in the experiment to be assigned back to their population of origin. The objective of the exercise is to assess which of the progeny from the different candidate populations is best adapted or suited to life in the particular river.

Physical trapping of sea migrating smolts (egg to smolt survival being one of the main measures of performance) is difficult for various logistical reasons; availability of sufficient manpower to monitor traps being the most obvious. This study, with the help of the Biomark system, combines state-of-the-art physical tagging methods and genetic methods for parentage identification to determine how the different groups and families compare in the river in terms of growth, survival and time of migration etc., without need for installation of large scale trapping facilities.

Atlantic salmon have been absent from the Bunowen for many years. The results of the experiment will be used to advise on efforts to re-establish salmon in the river by using uniquely acquired biological information to choose the best suited genetic material; and thus optimising the chances of successful outcomes for future salmon restoration programmes.



Pre-loaded PIT tags were inserted into the pre-smolts with a handheld reader designed and supplied by Biomark USA. The PIT tags are individually coded for individual fish recognitions. Fin clips were also taken during sampling for genetic identification.

Steps in the PIT tag array installation



Electricity had to be brought to the site to power the PIT tag array. This required inter-agency cooperation between IFI, Coillte and ESB. The ducting was laid by IFI ShRBD staff (approx 500m from the main road) and the power supply was connected by ESB Networks.

A total of 6 10ft antennae were required for the PIT tag array to ensure coverage of the entire river section. The antennae were designed by Biomark and installed by IFI ShRBD staff, with the aid of Biomark engineers. Many thanks to Steve Anglea and his team at Biomark for making the trip from Boise (Idaho) to supervise the installation of the new system. The entire equipment set was shipped by boat from the USA. The shipment included the antennae, PIT tag reader, battery sets, anchor system and specialised fitting equipment.

The river bed was left reasonably level with a slight indent to house the 10ft antennae. Fine adjustments were made by hand before the antennae were lifted into place. The antennae were pre-loaded with the anchor systems (right photo) before being placed in-situ.

Steps in PIT tag array installation (continued)



The six antennae were laid in two lines across the channel to increase the detection range for the PIT tags. The antennae were set in-situ by steel anchors which were driven into the substrate by a hammer drill. Once the anchor rods were driven into the substrate the anchors were set under tension by pulling with a spring lever mounted on an A-frame. The anchor tips can be seen in the top left photo. The protruding parts of the anchor rods (main photo) were cut with a bolt cutters, flush with the antenna surface.



Each antenna was connected to the reader unit, which was housed in a porta-cabin located on the adjacent Coillte site. The reader records and stores all PIT tags which come in range of the reader. It also generates a test tag at intervals to validate data-sets. The unit with the reader also houses a GSM unit to allow for remote access to the data. This remote access allows regular downloading and troubleshooting of the system. Extensive range testing was carried out on site after installation of the PIT tag array (photos opposite).



Establishing the PIT tag array at Clonbrock would not have been possible without inter-agency cooperation and the buy-in from local stakeholders. Coillte, ESB, IFI and Clonbrock Heritage all liaised closely on the logistics of housing this unit on an important heritage site. To mark the success of the installation a joint Fisheries Awareness Week/Heritage event was held in May 2012 to showcase the biodiversity and cultural heritage associated with Clonbrock Demesne and the River Bunowen.



Consideration of the aesthetics of the site at Clonbrock was very much to the fore during works on the PIT tag array, given the amenity value of the area. Picnic benches were placed at the site (above).

The Lord Mayor of Galway addresses the gathering during the FAW event in May 2012 (opposite).





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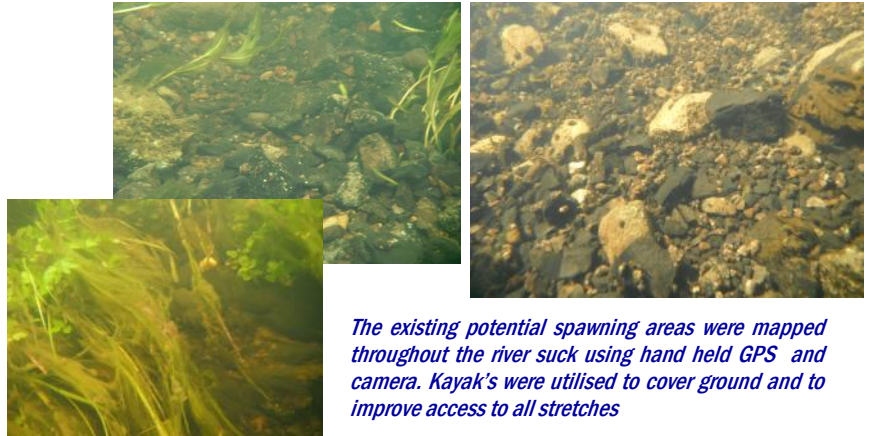


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Spawning habitat surveys

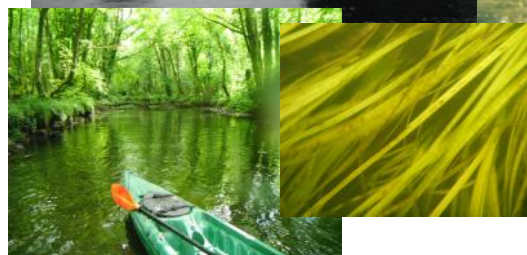


The existing potential spawning areas were mapped throughout the river suck using hand held GPS and camera. Kayak's were utilised to cover ground and to improve access to all stretches

Detailed spawning surveys were undertaken on the River Suck catchment, traversing Counties Galway and Roscommon. The objective was to identify the habitats where salmon and trout might spawn within the River Suck and where their might be shortfalls which could limit re-establishment. The study involved marking areas with suitable spawning gravel on a handheld GPS. Areas of non-spawning were also recorded. Photographs were obtained for all areas and some underwater shots of gravels were acquired. The intention of this exercise is to input this information as a layer into the AARC GIS and to have associated

photographs of habitat types along the River Suck catchment. To date, the entire River Suck sub-catchments have been surveyed in their entirety, by walkovers and kayak. These areas include: the upper River Suck to Castlereah; main Suck channel to Ballymoe; Francis River; Smagharaan River; Springfield River; Shiven/Kiline system (to Ballinamore Br); Bunowen River; Deerpark River; Ballinure; River Suck Lwr. This data will be linked to juvenile distribution and productivity information obtained from electro-fishing surveys. This will help inform management decisions relating to rehabilitation works, making decisions with respect to salmon restoration and assessing the strength and distribution of natural spawning..

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www.aarcproject.org
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Some photos from the spawning habitat surveys on sub-catchments of the River Suck