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ATLANTIC AQUATIC RESOURCE CONSERVATION (AARC) PROJECT

River Shannon—AARC

Progress to date

In the last newsletter issue (Dec 2010) we reported on a successful salmon broodstock collection programme from a number of rivers flowing into the in Shannon Estuary and from a control river outside the Shannon Basin. A total of 291 adult fish were collected and kept in dedicated holding facilities at the ESB hatchery in Parteen, County Clare. Of these, 260 fish were stripped yielding 371,224 eggs from 126 different families. The different families were kept separate in the hatchery and detailed records on mortalities, temperature and hatching conditions were maintained.

Full use was made of this unique

opportunity to acquire important biological information from these wild populations. Studies were carried out on the morphology, fecundity and egg sizes. Complete health screening was carried out on representative samples by the Marine Institute, Galway.

Once the eggs in the experimental populations reached the eyed ova stage, they were prepared for transfer to the experimental sites on the river Suck, County

Galway. These sites were carefully selected following detailed walkover surveys last year and were picked on criteria such as size, quality, access and logistics (transfer from hatchery).

An overview of the hatchery work, health screening and river site works is presented in this issue.



Fish Health Screening

Fish health screening was carried out by the Marine Institute's Fish Health Unit. This unit routinely carries out checks on wild and farmed salmon stocks throughout Ireland. All stocks for aquaculture and for transfer into or within Ireland are subject to checks under fish health legislation.

Fish health screening was carried out on the broodstock fish by the Fish Health Unit in the Marine Institute. This screening supplies important information on the health status of these wild salmon stocks. The Fish Health Unit routinely samples stocks throughout the country, particularly in relation to aquaculture activities, to help maintain a good fish health status for Ireland.

Fish health analysis on the brood-

stock involved examination of fish for any clinical signs of disease, such as swelling of organs, discolouration, lesions and general loss of condition. Fish were dissected for observation of internal organs. Tissue samples were retrieved and swabs taken for microbial analysis. Preliminary results show no signs of diseases. Ireland has a good disease status for diseases such as Infectious Salmon Anaemia and the ectoparasite *Gyrodactylus salaris*. The indiscriminate transfer of fish internationally and inter-regionally could undermine this health status and every effort should be made to uphold the strictest bio-security protocols.



Fish health screening was carried out by the Marine Institute on AARC broodstock. The screening involved observing morphological characteristics, clinical signs of disease, tissue sampling and microbial analysis

Experimental rearing of eggs and hatchery work

Critical to the success of the project was the use of the ESB hatchery facilities at Parteen and IFI hatchery facilities at Cong, Mayo. ESB, IFI and UCC fisheries staff coordinated the segregation, stripping and on-growing of salmon and salmon eggs at the rearing facilities.

Following implementation of strict hygiene rules, broodstock from the different locations were segregated in labeled ponds in the ESB Parteen facility. Further separation of males and females was undertaken. All fish were individually marked with a floy tag to enable the tracking of fish and tissue samples from all fish were obtained for genetics.

When ripe, the fish were stripped and eggs fertilised. Only male and female fish from the same origin (river source) and with only one male fish being paired per hen. The resultant progeny of the various crosses can, be assigned to individual parents based on the genetic profiles of the parents. This is an important aspect of the relative survival experiments (once eggs are placed out in the field, they can be mixed and when fry are retrieved at a later date, their family of origin can subsequently be determined).

Approximately 25 males and 25 females from each river (n=5) were stripped in the hatchery, producing 126 families or 371,224 eggs. These were separated by

family, in individual rearing trays. Accurate records of mortalities and other im-



portant parameters were kept on a daily basis by ESB fisheries staff and UCC staff.

Before packing the eggs for delivery to the experimental field sites, other important biological information was gathered. Complete fecundity (number of eggs per female) were calculated by measuring the size and volume of eggs and ascertaining the number of retained eggs in the female carcasses. This provides important information for the project but also provides important (and rare) information for use by national and international scientific committees.

For the field survival experiment, the eggs from each of the families had to be split 50:50 between to two field sites on the River Suck. This was done by working out the eggs sizes and volumes. Similarly it was imperative that eggs from the different families were mixed together in the egg envelopes so as to really test the relative performances of the fry in the field. This work was co-ordinated by UCC in the ESB hatchery facility at Parteen.

Salmon eggs are quite robust at the 'eyed egg' stage and prior



ESB fisheries staff monitored the salmon eggs on a daily basis, removing any dead eggs as a bio-security measure. This stage of development, with the dark spots in the eggs, is known as the 'eyed egg' stage.

to hatching, so it was during this stage of development that the eggs were disinfected and transferred to the field sites. To transport the eggs, special aluminum frames were manufactured by Graepel in Cork. The eggs were first placed into thin aluminum envelopes with interlocking sides which then slotted into the aluminum frames. Disinfection of the eggs was carried out



before the eggs were inserted into the rivers.

Eggs were placed into aluminium envelopes (horizontal units in photo above) which were then slotted into aluminium frames. Below: holding facilities in the ESB Parteen Hatchery, County Tipperary.



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Experimental sites on the River Suck

As highlighted in the previous newsletter, walk-over surveys were carried out around the River Shannon to identify suitable sites to assess the relative performances of a number of candidate populations. Important factors that were taken into consideration were:

- Logistics (transfer of eggs from hatchery, e/fishing surveys, etc)
- Water quality
- Salmon nursery habitat
- Absence of functional salmon populations

The River Shannon comprises very diverse riverine and lacustrine habitats and many of these catchments have been impacted by anthropogenic activities. It is clear that dredging and nutrient enrichment is having an impact on the quality of our rivers and lakes. If salmonid production areas are interfered with this will have a devastating impact on the survival of Shannon salmon populations.

There are a number of near pristine areas throughout the sub-catchment of the Shannon which can support strong salmonid populations.

The upper parts of the River Suck (Galway) is known for good brown trout populations and historically supported salmon fisheries.

Two sub-catchments on the River Suck were eventually selected for the common



Securing an artificial redd in the substrate on the river Bunowen, County Galway.



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garden experiments. These are the upper parts of the Rivers Bunowen and Tirur. Both rivers are characterised as limestone catchments and are productive waters with diverse macro-invertebrate communities.

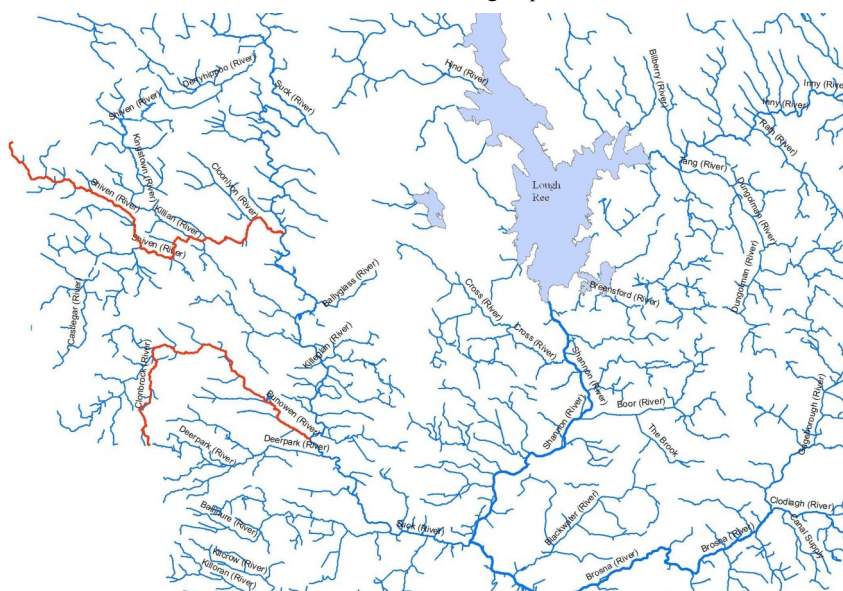
In February 2011, the eggs were transferred to the experimental sites. Contact was made with land-owners along the relevant river sections and access was secured. The 370,000+ eggs (equal numbers and representation from all experimental families provided to each river) were distributed among 45 artificial redds on each river (approximately 4,000 eggs per redd).

The redds were secured by pegs embedded through the frames and into the substrate. Rocks were placed along the outside of

The artificial redds (right) were embedded into the substrate in the experimental sites. The frames with the eggs slotted into these redds and a lid was secured on top.



the frame. Each redd was numbered and the location recorded with GPS. Once all the redds were filled, the eggs were left to hatch and the fry to disperse throughout the gravels. Regular checks were carried out to assess the success of hatching. Mortality rates were recorded for each of the redds, which averaged less than 1%. The artificial redds will be removed in July and first electrofishing surveys will be carried out in Aug/Sept 2011.



Location of the experimental sites on the River Suck, County Galway (red coloured rivers). The River Tirur is on the Shiven system (upper river) and the River Bunowen enters the main River Suck below Ahascragh.



The artificial redds on the River Tirur, County Galway . The aluminium egg envelopes are shown (left) and the frames in-situ (above).



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The next steps in the project will involve electrofishing at the experimental river sites on the Rivers Bunowen and Tirur (Suck Catchment). This will involve quantitative sampling to ascertain the density of fish at the selected sites, the overall survival of the eggs to the 0+ parr stage as well as the provision of tissue samples for genetics based parentage assignment. The sampling at the experimental sites will take place in summer 2011 and summer 2012. In 2012, PIT (passive induced transponders) tagging of a sub-sample of fry/smolts will take place with in-situ readers being inserted on the lower stretches of at least one of the experimental rivers. Additional electrofishing will be carried out throughout the River Suck catchment and on other catchments around Lough Derg for identification of locations of natural spawning.

We're on the web!
www.aarcproject.org

Reporting and Communicating

The AARC project reports regularly to the EU Commission as agreed during the project application phase. The reports involve financial and activity reporting on a six monthly basis. Ireland's reports are first signed off by the BWM Regional Assembly (Ballaghderreen, Roscommon) as the first level controller, before the combined international partners reports are approved by the Commission. To date three financial reports have been submitted and approved.

In addition, the project disseminates information through its web portal at www.aarcproject.org and through the various partners websites (www.fisheriesireland.ie). This newsletter is the second edition from the Irish partners and a poster was

published for the launch in Exeter (UK) last year. The first newsletter edition was circulated to angling clubs and other relevant stakeholders. It was also circulated electronically to relevant contacts and agencies.

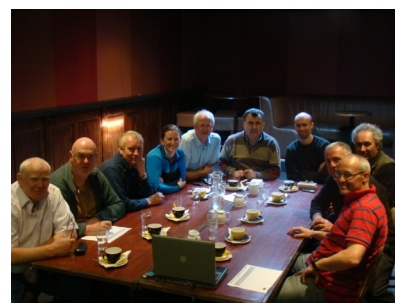
Updates on the projects were presented at various catchment management meetings throughout the Shannon and to

Regional seminar with IFI staff, Mountbellew, County Galway.

relevant partnership groups/committees.

More detailed scientific, peer-reviewed publications will be produced at a later date once all the data is accumulated.

The partnership approach, international links and improved scientific knowledge will provide for informed management for salmon on the River Shannon.



AARC is striving to communicate progress on the project to all interested parties through web portals, newsletters and stakeholder meetings