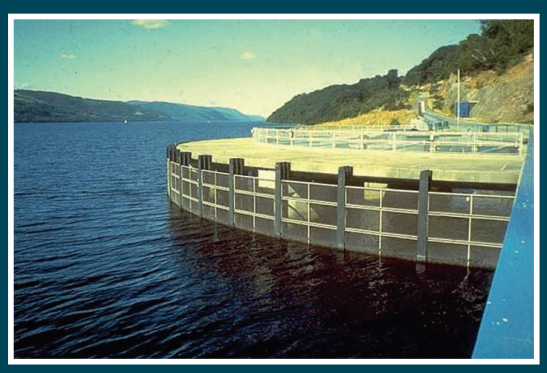
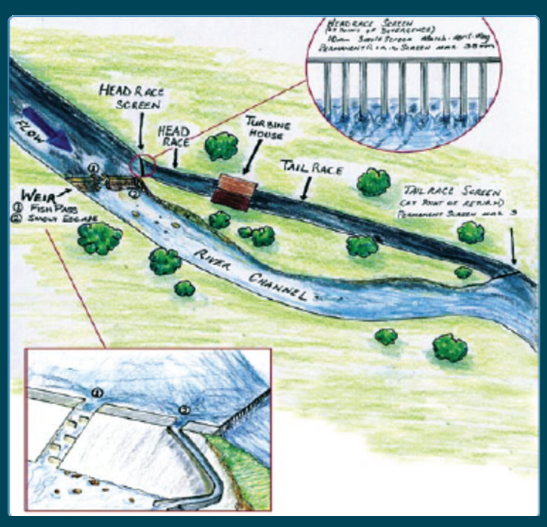
DOWNSTREAM FISH PASSAGE FACILITIES

Downstream fish passage technologies are much less advanced than those concerning upstream fish passage facilities and are the area's most in need of research. This is obviously partly due to the fact that efforts towards re-establishing free movement for migrating fish began with the construction of upstream fish passage facilities and that downstream migration problems have only more recently been addressed. This is also because the development of effective facilities for downstream migration is much more difficult and complex. As yet, no country has found a satisfactory solution to downstream migration problems, especially where large installations are involved (EPRI, 1994).



Fine mesh screen at a hydroelectric power plant intake on the Loch Ness in Scotland.
(Photo Travade)



Low head run of the river Hydro-Scheme
(Drawing by Myles Kelly IFI)

The partial-depth system recently installed in the intake channel of the Holyoke hydroelectric power station on the Connecticut River has an efficiency of 86% for juvenile clupeids and 97% for Atlantic salmon smolts (Odeh and Orvis, 1998).

The hydrodynamic or `louver' screen consists of an array of vertical slats aligned across the canal intake at a specified angle to the flow direction (ASCE, 1995) and guide fish towards a bypass. It has been used with some success in several sites, namely on the east coast of the USA:

Louvers may be considered for sites with relatively high approach velocities, uniform flow and relatively shallow depths. The efficiency is highly dependent on the flow pattern in the canal intake (ASCE, 1995). The first louvers were installed over the full depth of the approach channel.

However, more recently, several `partial-depth' louver systems have been installed in the USA, based on the observation that migrating Atlantic salmon smolts and juveniles clupeids remained in the upper portion of the water column.

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Angling Council Ireland

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Guidelines for Small-Scale Hydro-Electric Schemes in Ireland

Hydropower in Ireland

Barriers to migratory species of fish including Salmon Sea Trout, Eels Upstream and downstream migrations put species at risk

Inniscarra Dam Cork, has a Boreland Fish Pass and is not effective for upstream and downstream migration of salmon. A hatchery is provided upstream to supplement stocks on the River Lee. During the 1950's, an estimated 15,000 salmon went up the Lee to spawn each season, but all that changed with the completion of the two dams in 1957. By the late 1960's, the salmon run had dropped to less than 1,000.

The failure of the Ardnacrusha fish-lift.

The fish pass at Ardnacrusha is a Borland type vertical fish-lift. The bottom chamber and the vertical shaft are built in an area which was left for a 6th turbine at Ardnacrusha. Although at least 45,000 salmon should be passing upstream on the River Shannon each year if the river was reaching its "conservation limit", in reality only a few hundred salmon pass upstream here each year. Indeed, so embarrassing are the numbers here that the ESB no longer publish the fish counts. It is clear that this fish pass has been a failure, and it is time to start looking at new ways of helping salmon (and other migrants such as lampreys) reach the upper Shannon.

The European Anglers Alliance has produced the enclosed video which clearly shows the problems associated with Hydro-power.

The video "The end of the river" as the title suggests provides an insight into many of the problems migratory species face when they encounter hydro-power barriers during upward and downward migrations. The video explains the truth and reality of the impact hydropower has on the natural environment and also explains why it is not a green energy source.

There are many small scale hydropower plants dotted around Ireland on our rivers and many of these have not been used for some years now. Despite owners having responsibility under fisheries legislation to have the barriers removed and the river courses put back to their original state, they have taken little or no action to put things right. Recently we have seen keen interests in small scale hydro-power again as grants were made available from EU funding for small scale operators.

Anglers and Inland Fisheries Ireland are spending millions of euro on salmon habitat protection and development to help the migratory species gain access to good quality spawning streams. Unfortunately many of our spawning fish encounter these hydropower schemes, smolts, kelts and eels migrating up and downstream are impaled in older poorly designed turbine screens and are cut up in the turbines.

The Department of Communications Energy and Natural Resources together with Inland Fisheries Ireland and other agencies have produced Guidelines on the Planning, Design, Construction & Operation of Small-Scale Hydro-Electric Schemes and Fisheries. Many of the recommendations made in this document if implemented in full would go a long way in addressing the problems associated with hydropower in Ireland.

(Extract below and copy on disc)

Potential Effects of Small Hydro-Electric Development on Fisheries.

The impact of a hydro-electric development on a fishery ecosystem will be determined by the location, scale, nature and design of the development and the type, size and location of the associated fishery. The individual nature of each hydroelectric installation, coupled with the turbine technology used, means that the effect can range from negligible to total mortality, (Cada & Francfort, 1995). The effect is likely to be considerable with large-scale installations with high dams and a review of the potential effects of such installations in Ireland has been undertaken (Mathers et al, 2002). The potential impacts of small-scale hydro-electric developments are reviewed below.

Low Head Schemes - Impacts on the Natural Channel

In low head schemes the volume of water being diverted from the main channel is large relative to total flow and may reduce the residual flow in the natural channel to such an extent that there is habitat loss, and floral and faunal communities and native fish populations are severely affected. Assimilation capacity may also be affected. Adverser epercussions can result from indirect effects such as disruption of food webs downstream, drying out of redds or egg masses, stranding of fish, and siltation of spawning gravels due to the absence of high flows, (Cowx, 1998). Water temperature regimes are also important with respect to egg development and hatching rates and as a cue for fish migration, thus any changes may disrupt these processes.