

Theoretical study of fishways and development of an efficacy evaluation Methodology.

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ABSTRACT

This first thesis in the ETSECCPB of introduction to the world of fishways, is composed by a general approach to the fishladders in Catalan rivers and a development of a new evaluation methodology of the efficiency. Actually, the importance of this type of infrastructure is becoming bigger despite that they do not show an immediate improve of the net profits in the Catalan society, but they mean an improvement of the environment and the diversity of the habitats that surround us. These factors are going up, at the time that the basic necessities are being met.

The thesis is divided in three main sections which are summarized in the next lines. The first block talks about the aspects related with the users of this atypical infrastructure, the fishes. In this section are given the details of the fish species present in the river sections and the necessity of the different species of making migratory movements. Also, it has been done a recompilation of the different investigations carried out in terms of swimming and jumping capacities. Finally, it is showed a brief explanation of the force that appears in the calculation of swimming movement, particularly the Drag Force and estimation of Drag Coefficient.

Once the user of the infrastructure has been introduced, the second block is focused on the nonlife component, the infrastructure. The types of fishways and fishladders and their possible configurations are explained, making remarks on the singularity aspects.

After, it has been carried out a research of the existence of a fishway data base in Catalan rivers, paying attention on the maintenance and efficiency.

As a result of the poor fishway efficiency that appears in the previous section it was decided to develop a new efficiency evaluation methodology in this third block. To achieve this objective, previously the actual efficiency methodologies for fishways are explained. The process developed is based mainly in the use of 2D numerical modeling of water movement software. The program used is FlatModel, which has been developed by the research group GITS. The methodology has a very simple approach: compare and contrast the fish swimming capacities against the required by the fishway. This comparison has been done with the calculation of energy required for the progress of the fish through the streamline, which is the path that the fish follows; against the maximum energy that the fish is able to generate. Depending of which of these two concepts is dominating the verdict is emitted. The concept seems at first impression to be simple, but there are a great number of variables influencing the results: water temperature, fish length, fish species, discharge of river, etc...

In the last section of conclusions, the main ideas developed and achieved during the study are summarized. Together with the conclusions, possible future line investigations are explained. This future line investigations have been considered interesting and could be carried out by the investigation group GITS in the context of other thesis development.