

# DWA - Topics

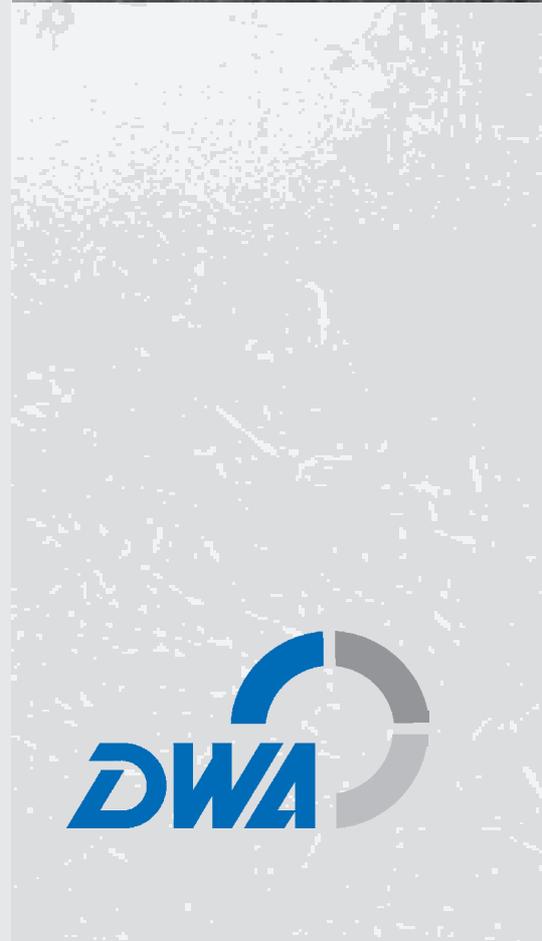
## Fish Protection Technologies and Downstream Fishways

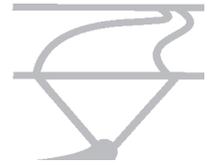
Dimensioning, Design,  
Effectiveness Inspection

July 2005



Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall e.V.  
German Association for Water, Wastewater and Waste





# **Fish Protection Technologies and Downstream Fishways**

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Effectiveness Inspection**

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The DWA – German Association for Water, Wastewater and Waste – is in Germany spokesman for all comprehensive water queries and is intensively committed to the development and distribution of a secure and sustainable water supply. It works as a politically and economically independent organisation professionally in the fields of water management, sewage, waste and soil protection.

DWA is in Europe the association with the largest number of members within this field and therefore takes up a special position. This is because it provides professional competence regarding standardisation, professional training and information towards the public. Approximately 14.000 members represent the experts and executives from communes, universities, engineering offices, authorities and enterprises.

The main emphasis of its activities is on the acquirement and update of a uniform technical set of rules and standards as well as the cooperation on the list of technical norms on a national and international level. In this connection not only are the technical scientific topics involved, but also the economic and legal interests of the environment and water pollution forms a part.

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## Foreword

Since the state-of-the-art of fish passes has been considerably improved, which not least is owed to the DVWK-publication 232 (1996), the demand for free passage for downstream migrating fish gains increasing importance. Next to an ecologically oriented operation management of dams and inlet works, fish protection facilities and downstream fishways are the only possibility to reduce the obstructing effect of in-stream obstacles (dams and weirs etc.) for migratory fish and to restore river continuity.

Fish protection facilities and downstream fishways in Germany have so far been built in a small number only. When dealing with this topic, it was discovered that the knowledge available was seriously insufficient with respect to the migratory behaviour and the functioning and application of fish protection facilities and downstream fishways. Application oriented research concerning the migratory behaviour of indigenous fish has started only recently, and individual fish protection facilities and downstream fishways were subjected to operational checks. Against this background, the knowledge and experience available in foreign countries had substantially to be taken as reference for this publication. It is therefore the main intention of this publication to contribute to intensified efforts for the eco-technical optimization of installations to ensure fish protection and downstream fish migration.

The present volume of the *ATV-DVWK-Topics* first of all deals with biological principles and explains the mechanisms of fish migration, which need to be considered as a vital precondition for functioning fish protection technologies and downstream fishways. General comments on obstacles follow, which cover all types of dams according to DIN 19700, including operational installations like weirs, hydropower plants and inlet works as well as sluices which will obstruct or delay the migration of fish and / or present hazards for migrating fish. The following technical recommendations for the design, hydraulic dimensioning and effectiveness of various migratory installations on the one hand differentiate between protection technologies, that prevent fish from entrainment into dangerous areas, and downstream fishways on the other hand, that provide fish with a safe passage into the tailwater of obstacles. These chapters are complemented by presentations of fish collection and transportation systems, descriptions of fish-friendly turbines, as well as alternative procedures, and finally offer suggestions for an installation management that is adjusted to migratory fish. Also frame conditions for planning and permission as well as legal matters are taken into consideration.

# Fish Protection Technologies and Downstream Fishways

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The Technical Committee "Hydraulic Engineering and Hydraulic Power" of the ATV-DVWK (now DWA) has installed the interdisciplinary Working Group WW-8.1 "Fish Protection Technologies and Downstream Fishways" to assess the knowledge available on the construction and operation of such installations. The following representatives of consulting companies, engineering consultants, energy supply companies, water associations and specialized authorities have cooperated in the preparation of this publication.

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The work has been subjected to a public appeal procedure prior to its publication, of which all objections received have been carefully reviewed and where suitable incorporated in the present publication. Thanks shall hereby be extended to all senders of constructive objections and remarks. Our special appreciation and thanks are also addressed to the Vereinigung Deutscher Elektrizitätswerke (VDEW e.V. - Association of German Power Plants), representatives of the fishing trade, manufacturers of turbines, trash rack and screen cleaning machines as well as fish protection facilities, development institutes for hydropower technologies, dam operators as well as specialists from authorities and associations, who have supported our work with technical contributions and advice. Furthermore, we are grateful to the many foreign specialists, whose expertise has become a vital contribution to the success of this work.

Antrifftal, May, 2004

Beate Adam

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