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## Preface

# Project Fischnetz: Decline of fish catch in Switzerland

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Since the beginning of the 1980s, a decline in fish catches of up to 50% has been reported in Switzerland. Most of the data available were for the native brown trout (*Salmo trutta*), but data were also available for grayling (*Thymallus thymallus*), roach (*Rutilus rutilus*) and other species. In addition, the health status of numerous brown trout populations has been found to be impaired, with macroscopic lesions, histopathological alterations of liver, kidney, gills and skin noted repeatedly in feral fish.

Alerted by several studies on these issues, fishermen, responsible authorities and some scientists started to discuss the problem and raise hypotheses to unravel the causes for the observed phenomena. Unable to immediately identify the causation, the need for a nationwide research network was addressed at federal research institutions and authorities. In 1999, the interdisciplinary Swiss-wide project Fischnetz was initiated. The project aimed to (I) document fish catches, population abundance and fish health in Swiss rivers, (II) identify the most important causes of the present situation, and (III) develop measures to improve the situation.

To structure the search for the causes, 12 hypotheses were developed (Burkhardt-Holm et al., 2005), organised into specific research questions, and compared to existing knowledge. Knowledge gaps were filled with results from new projects.

In total, 77 projects were conducted or included in Fischnetz over a 5-year period. Collectively, the final datasets demonstrated that more than one factor is likely contributing to the decline in fish catches and that sev-

eral of the hypotheses are interrelated. PKD was identified as an important factor to declining fish catches (Wahli et al., 2007). Fischnetz demonstrated an association of within-stream gradients in water quality, PKD prevalence, fish health and brown trout biomass (Zimmerli et al., 2007). Although adverse effects on reproduction physiology downstream of sewage treatment plants have been reported, the exposure of brown trout to estrogens in the field did not appear to affect the investigated reproductive parameters (Körner et al., 2007). Correspondingly, successful recruitment of brown trout was observed in most sites investigated, but this study also emphasized the need for intact habitat morphology to ensure sufficiently large natural recruitment (Schager et al., 2007). To integrate and evaluate all of the collected data, different approaches were followed. One of these approaches, the weight-of-evidence approach that queries the occurrence, relevance and interrelationship of potential factors, thereby making the assessment of the available evidences as transparent and objective as possible, is presented here (Burkhardt-Holm and Scheurer, 2007).

Fischnetz took the problem of declining fish catches, identified by fishermen and authorities, and dealt with it via inter- and transdisciplinary research. Due to the high diversity of potential causes, ranging from impacts of climate change to increase in predation by fish eating birds, chemical pollution due to micropollutants to alteration in habits and attitudes of fisheries management, Fischnetz had to cover a range of different scientific disciplines and integrate them to develop a comprehensive, holistic answer. Accordingly, 8 different disciplines were involved in the project (biology, chemistry, physics, environmental science, veterinary medicine, geography, sociology, psychology).

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Attempting to solving a real-world problem such as declining fish populations and impaired fish health is most promising if persons concerned and stakeholders involved are incorporated from the onset. This approach was adopted at all levels of the project and stages of the work, from developing measures to formulating suggestions as to how to alleviate the status in a collaborative manner. As a consequence, Fischnetz also improved the coordination of relevant diverse research activities and enhanced communication between stakeholders, scientists and the public, thus leading to increased public acceptance. This was, among others, reflected by the considerable financial support from all 26 Swiss cantons, Federal and Cantonal Authorities, the Chemical Industry, and the Fisheries Association of Switzerland (Burkhardt-Holm, 2007).

The project Fischnetz was situated at Eawag, one of the four federal research institutions of the ETH domain in Switzerland. Fischnetz was defined as a cross-cutting project, meaning that multi-disciplinary issues were addressed that were often raised as a public need. Eawag's mission statement is to bridge the gap between science and society by providing high excellence in research projects and collaboration with external experts and stakeholders. Environmental problems will increase in the future with ever increasing resource requirements and the concurrent depletion of natural resources and corresponding conflicts of interest. Consequently, inter- and transdisciplinary projects and institutions where such challenges can be rigorously tackled are of urgent need.

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