

Publication

A Bayesian network for investigating the decline in fish catch in Switzerland

ConferencePaper (Artikel, die in Tagungsbänden erschienen sind)**ID** 3719856**Author(s)** Borsuk, Marc E.; Burkhardt-Holm, Patricia; Reichert, Peter**Author(s) at UniBasel** [Holm, Patricia](#) ;**Year** 2002**Title** A Bayesian network for investigating the decline in fish catch in Switzerland**Editor(s)** Rizzoli, A. E.; Jakeman, A. J.**Book title (Conference Proceedings)** Integrated assessment and decision support. Proceedings of the 1st biennial meeting of the International Environmental Modelling and Software Society**Place of Conference** CH-Lugano**Publisher** International Environmental Modelling and Software Society**Pages** 108-113

Catches of brown trout have decreased about 50% in many rivers and streams in Switzerland in the past 15 years. Additionally, the health status of numerous brown trout populations has been assessed to be impaired. In order to evaluate the causes for these phenomena, a nationwide interdisciplinary project named "Fischnetz" was launched in 1999. Twelve hypotheses for the fish population declines were proposed and laboratory and field research projects were initiated to investigate these suggested causes. To apply the results of these investigations to the task of discerning the relative causal importance of each of the hypotheses, a Bayesian probability network is being developed. The development of a "Bayes net" begins with eliciting mental models about the cause-and-effect relationships among system variables from subjectmatter experts. Represented as a graphical network, these models imply a set of assumptions about the conditional dependencies among the variables, which simplifies the problem of working with imprecise knowledge. Hard-to-derive joint probability distributions are replaced by a set of conditional distributions, which can be characterized using either: (1) experimental investigation, (2) collected field data, (3) processbased models, or (4) elicited expert opinion. Such information, available as a result of the "Fischnetz" research program and from the scientific literature, will be integrated into the network, thus quantitatively summarizing all relevant information. The quantified network will then be used to assess the historical causal importance of anthropogenic changes, as well as predict the effect of proposed management actions. Analyses will be carried out for individual streams using site-specific information as evidence to update less specific prior beliefs. The results can be used form the basis for preliminary management and to prioritize future research projects based on their ability to reduce uncertainty in model-based assessments. In this paper, a first prototype of the network is presented and the methodology for its construction and application is discussed.

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