

The Swiss lakes: no longer black holes

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An international research team under the leadership of Eawag, the Swiss Federal Institute of Aquatic Science and Technology, and the Natural History Museum in Bern is quite literally getting to the bottom of the lakes in and around the Alps. The fish population is being documented scientifically in “Projet Lac” more systematically than ever before. Early investigations in the Murtensee have brought to light results that could not be ascertained from the fishery statistics in use up to now.

By law, the populations of the various species of fish in Switzerland must be known and documented precisely. A similar requirement is included in the EU regulations on aquatic systems. Experts have had to provide statistics showing which species are especially threatened and therefore require protection. But in fact little is known about the species in the larger European lakes. Fishery statistics are usually the only available data. The count of each species caught is known, as are the quantities of fish stocked in the lakes, but the actual diversity is not known.

Knowing more about the emergence and disappearance of species

Eawag and the Natural History Museum in Bern began the project in 2010, the International Year of Biodiversity, with the idea of casting more light into the depths of the Swiss lakes. The larger lakes will be fished systematically, and the species caught will be identified, measured and photographed. The catches will be being counted and evaluated statistically. “In this way we can find out for the first time just how high the level of fish biodiversity in the lakes really is at this time”, says the leader of “Projet Lac”, Prof. Ole Seehausen from Eawag and the Institute of Ecology and Evolution at Bern University. “In this project we also want to find out why the species variety and composition vary from lake to lake, sometimes to a great extent, and the ecological reasons for the emergence and disappearance of species.” The project brings together experts from various neighbouring countries, for in the last analysis it is not just a matter of scientific knowledge, but rather of keeping fish stocks in the lakes in and around the Alps sustainable for the future. In addition, an extensive collection of fish and tissue samples is being built up at the Bern Natural History Museum, which will serve as an international reference for future research projects.

Sobering results from the Murtensee

Up to now the three lakes in Murten, Annecy and Bourget (both in France) have been fished, and more than 8000 fish have been recorded and 29 species have been identified. The results from the Murtensee show that more than a third of the fish species described by J. Gugelhard in 1840 has disappeared. Structured and therefore vital habitats for fish in the lake have declined by 30%. In addition, 30% of the lake shore is now man-made or built up. Finally, at depths below 20 metres there is too little oxygen to support those species of fish that require deeper water.

On the other hand, species previously unknown in the Murtensee have been found: a rudd of the morphological type known as the Italian rudd (*Scardinius hesperidicus*), and a spined loach with the morphology of the Italian species (*Cobitis bilineata*). For the first time a Prussian carp (*Carassius gibelio*) has been caught. This first standardised survey of the fish population also shows that professional and amateur fishermen have a selective effect on the species in the lake. The fishermen take out pikeperch, pike and catfish in numbers proportionally greater than their presence in the lake. Other species, like carp and small fish, are hardly caught at all. This has a marked influence on the age

structure of the fish populations in the lake. For instance, there are many juvenile fish and comparatively few adults among the heavily fished pikeperch. The standardised data on fish fauna thus present a quite different picture from the cantonal fishery catch records.

Optimum use of funds for evaluation measures

Ole Seehausen is convinced that the data resulting from the 2.4 million franc project will further the preservation of fish biodiversity. "For example, our results will give us pointers as to how revitalisation of the shore or the upgrading of shallow water zones should be carried out so as to enjoy the greatest possible chance of success." The project leader hopes that in addition to the lakes in Switzerland listed below (box), more large lakes can be inventoried. Several are already in the planning stage.

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