

## The current situation of the River Enns fish fauna around the Gesäuse National Park

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### Abstract

In two segments of the Styrian part of the River Enns the effectiveness of river engineering measures, implemented in the course of a LIFE-project, was evaluated by electrofishing. No improvement was detected - probably due to the small dimension of the rehabilitation measures that could not alter the overall bad ecological condition of the River Enns in Styria. This condition results firstly from channelization, but also from hydropeaking and periods with a surplus of fish predators. Improvement can only be gained by extensive restoration programs.

### Keywords

river engineering, fish fauna, restoration measures, predators

### Introduction

The River Enns is the longest river that has both its source and its mouth within the Austrian borders and covers a distance of over 255 kilometres. 120 kilometres of the watercourse are situated in the federal state of Styria, including the two reaches in which the present study was conducted. The investigations were performed as a post-monitoring program of a LIFE-project that dealt with morphological improvement measures in the River Enns and in the mouth of several tributaries.

The two studied reaches are distinguished by their morphology, the upper stretch 'U' - 'Paltenspitze to Gesäuseeingang' describing a very massively regulated and channelized river stretch that is deepened several metres and suffers from fine sediments deposited in the hyporheic interstitial and destroying this very important environment. The lower study reach 'L' - 'NP Gesäuse - Gofersgraben to Johnsbachmündung' is much steeper, showing a more straightened natural river course. While stretch 'U' is regulated nearly along the whole range, the downstream stretch 'L' exhibits only short, punctual areas with rip-rap or other bank stabilizing measures.

Both investigated reaches are parts of SAC sites. Nevertheless, they both suffer from hydropeaking at hydropower sites in big tributaries on the one hand, and have not recovered from intensive fish-predation by cormorants in the middle of the 1990s.

### Methods

Electrofishing with special boats was performed in both stretches in order to investigate the current status of the fish fauna. Both reaches were dealt with from the upper end of the stretch to the lower, fishing with an anode arrangement from boat, and additional habitat sampling with a backpacker generator.

The collected data were analysed and compared with data collected before the implementation of the measures in the years 1994, 1997, 1998, 2006, 2009 and 2015 (JUNGWIRTH et al. 1996, ZAUNER 1999, WIESNER et al. 2008, WIESNER et al. 2010, LUMESBERGER-LOISL & GUMPINGER 2015) in order to get an impression whether the LIFE-measures have led to a better ecological status of the river stretch with regard to the fish fauna.

### Results

The electrofishing results showed that there is a large lack in species numbers, mainly in the upper stretch, and also in biomass. This phenomenon has been evident since the beginning of the investigations in 1994, resulting from river regulation and the vanishing of the historically extended floodplains that had led to the extinction of several specialised fish species. In the 'U' stretch, half the number of species that should be found there according to the Leitbild are missing. Those species that are still detectable appear only in small numbers and most of them show deficits in their population structures.

There has been no significant variation in the number of species nor in the number of individuals since the year 1996 when there was a drastic breakdown of the fish stocks as result of massive predation by cormorants. For the grayling (*Thymallus thymallus*) ZAUNER (1999) proved that numbers of individuals per hectare went down from 578 in the year 1994 to only eight after the year 1996. The same decline was found with the biomass of grayling, having dropped from 154 kg/ha to 2.4 kg/ha.

The development of the other fish species was similar, but not that dramatic. There was a significant breakdown of the fish stocks in the Styrian River Enns stretches in the year 1996, when due to a very cold winter many cormorants had moved upstream into these stretches that are several hundred kilometres away from the main cormorant stocks near the river Danube.

Data from the investigations of 1998, 2006, 2009 and 2015 show that fish stocks did evolve positively, but could never reach the status of 1994. It is the grayling that seems inapt of generating a good brood stock with enough parental individuals to re-establish a population rich in individuals.

## Conclusion

Unto the mid-1990s the data show the effects of river regulation and channelization that become manifest in small numbers of species and the absence of specialist groups, mainly those living in adjoining waters, oxbows and backwaters.

In 1996, a very cold winter and the linked massive predation of cormorants led to a breakdown of the already tattered stocks of the remaining species. The fact that the grayling population had been reduced down to a few individuals can, on the one hand, be explained with the vulnerability of this species towards predators that, like the cormorant, hunt in the free water column. On the other hand one has to take into account that the populations of the other species – mainly rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta fario*) – are supported by intensive stocking of the angling societies, which is not the case to that extent for grayling. As a consequence, not one single grayling must be permitted to be taken out of the ecological system – otherwise this species will undergo a catastrophic shift (SCHEFFER et al. 2001), which could make the species vanish from these river stretches.

Concerning the main goal of the investigation, which was to examine the effects of restoration measures, we have to conclude that there seem to be two main topics that have to be solved in order to ameliorate the ecological situation of the fish fauna in the two stretches:

Many more and much bigger morphological measures are needed. We can see first gentle effects of the measures that had been set until now, but we have to set measures that are able to create a much more original river-landscape with the potential for the river itself to initiate a dynamic development. On the other hand, the hydrologic regime, impaired by the hydropeaking mode of the upstream hydropower plants, has to be revised in a form that the flush and sink rates are reduced markedly.

## References

- JUNGWIRTH, M., S. MUHAR, G. ZAUNER, J. KLEEBERGER & T. KUCHER (1996): Die steirische Enns - Fischfauna und Gewässermorphologie. - Abteilung für Hydrobiologie, Fischereiwirtschaft und Aquakultur, Universität für Bodenkultur, Wien, 260 S.
- LUMESBERGER-LOISL, F. & C. GUMPINGER (2015): Post-LIFE-Monitoring Fischökologie Enns - Erhebung des fischökologischen Zustands in den Befischungsstrecken des LIFE-Projekts „Naturschutzstrategien für Wald und Wildfluss im Gesäuse“. – Im Auftrag der Nationalpark Gesäuse GmbH, Wels, 55 S.
- SCHEFFER, M., S. CARPENTER, J. A. FOLEY, C. FOLKE & B. WALKE (2001): Catastrophic shifts in ecosystems. – Nature, Vol. 413, 591-596.
- WIESNER C., G. UNFER, A. FORAMITTI & M. JUNGWIRTH (2008): Naturschutzstrategien für Wald und Wildfluss im Gesäuse – Prämonitoring Fischökologie. – Im Auftrag des Amtes der Steiermärkischen Landesregierung, Fachabteilung 19B Schutzwasserwirtschaft und Bodenwasserhaushalt, Wien, 25 S.
- WIESNER C., G. UNFER, A. KAMMERHOFER & M. JUNGWIRTH (2010): Naturschutzstrategien für Wald und Wildfluss im Gesäuse – Postmonitoring Fischökologie. – Im Auftrag des Amtes der Steiermärkischen Landesregierung, Fachabteilung 19B Schutzwasserwirtschaft und Bodenwasserhaushalt, Wien, 32 S.
- ZAUNER, G. (1999): Einfluß des Kormorans auf die fischökologischen Verhältnisse der steirischen Enns zwischen Liezen und Johnsbach. - i.A. des Amtes der Steiermärkischen Landesregierung, Rechtsabteilung 6, Naturschutz. - Wien, 58 S.

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