

ARTIFICIAL FERTILIZATION OF THE OHRID TROUT AND THE PRESENCE OF ITS SUMMER FORM IN THE LAKE

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Abstract

*Management and conservation of Ohrid trout, the most important endemic species of this lake, is one of the main issues of collaboration between the two transboundary states. The decline of fishing amount during the years is improved by the artificial fertilization of koran applied both in Macedonia and Albania. Thereby, lake Ohrid reinhabited with about one million offsprings of *Salmo letnica* per year, only from the Albanian part. The technical enhancement of artificial fertilization makes possible the considerable increase of the koran amount in the hunting period. Meanwhile, the koran summer form, *Salmo letnica aestivalis* has resulted in a decrease of the fishing amount according to data fishermen. The main purpose of this paper is to show that the management of koran artificial fertilization is directly connected with the fishing amount. So the enlargement of artificial fertilization even in summer time, for the Albanian part, will result in the fishing summer form increased.*

Key words: artificial fertilization, conservation, Ohrid trout, *Salmo letnica aestivalis*.

INTRODUCTION

Lake Ohrid, a lake of tectonic origin is localized in Balkan region, in the transborder area between the two countries; Macedonia and Albania. According to many authors the period of its existence exceed 2-3 million years (Satankovic, 1960), making it one of the long-lived lakes in the world, that for more than 1 million years has provided a freshwater habitat for its species. Despite the fact that some biotic groups are poorly studied or not studied at all, approximately 1200 native species are known from the lake, including 586 animals and at least 212 are endemic. With these endemic species and a surface area of 358 km², Lake Ohrid is probably the most diverse lake in the world, taking surface area into account (Albrecht & Wilke, 2008). Ten of 17 fish species and 34 of 38 kinds of mollusks that populate the lake, thought to be endemic (Stankovic, 1960). Among salmonoids, Lake Ohrid trout, *Salmo letnica* (Karaman, 1924) or Koran, is an important element of the freshwater fauna and as it is placed clearly on the phylogenetic Adriatic group *S. trutta* mtDNA (*S. trutta*, Bernatchez, 2001 dhe Apostolidis, et al. 1997, *S. letnica*, Sell & Spirkovski, 2004). The so-called Ohrid trout or Koran, *Salmo letnica*, by different authors (Stefanovic, 1948; Stankovic, 1960; Dimovski, Grupce and Spirkovski, 1992)

has been considered as a polymorphic specie regarding to the taxonomy and ecological characteristics. According to the authors above, based on various data there are four forms of Ohrid trout that can be distinguished by the different intralacustrine environments, by the time and the different substrates that they use for spawning. There is an absence of the studies that determine the genetic differences of these forms, however Sell and Spirkovski have shown that *Salmo letnica typicus* and *Salmo letnica aestivalis* are two genetically distinct forms based on the sympatric differentiation results. To preserve and protect natural resources and biodiversity of Lake Ohrid, the Lake Ohrid Conservation Project is applied (LOCP). The realization of the project objective has developed and supported effective cooperation between Albania and Macedonia for joint environmental management of the watershed. The project began in late 1998 and early 1999, with an expected duration of three years. One of the most important points of Lake Ohrid Monitoring Program has been the conservation of the most important species of this lake. But while the Koran or Lake Ohrid trout, is also subject to important fisheries, in order to maintain the natural lake population in stable conditions, and to allow fishing at the same time, since 1935 is established the process of

artificial fertilization and the repopulation of the lake, already in Macedonia and Albania respectively. Since then, the lake reinhabited each year with about 1 million fingerlings from Macedonian and Albanian side as well. The lake restocking with fingerlings from Koran artificial fertilization is significantly reflected by the increasing of the fish's number in the fishermen catches and at the other side this avoid the endangerment of a particular fish specie such as *Salmo letnica*. But this artificial fertilization, mainly is realized for the Koran winter form in November- February, its reproduction period. Years ago, in Struga is realized the artificial fertilization of the Koran summer form, but in a small amount. The main purpose of this paper is to show that the artificial fertilization of *Salmo letnica aestivalis* would help the conservation and protection of the Koran summer form as one of two genetically distinct forms of Ohrid trout.

MATERIALS AND METHODS

The realization of this paper is based on data collected over the amount of fishing for several years and the cultivation techniques of Koran on the Lake Ohrid Albanian side. We provide quantitative data through the inspectorate office of fisheries in Pogradec, on Koran catches from 1947 to 2013. The processing in Microsoft Office Excel of catches quantities in quintal [metric] (1 quintal = 100 kg) over the years gave us a development trend in the graphical representation of these measurements. These data are collected by licensed boats that accurately respect the allowed fishing periods for Ohrid trout. It is important mentioning here that in addition to licensed individuals there are unlicensed fishermen that for several years have done abusive catches who have influenced in the quantity mismatches of Ohrid Trout in the lake. In contact with the Specialist of Ohrid trout growing economy, in Lin, Pogradec, we have followed the work realized in different development stages and the growth environments until the fishes reached the fingerling stage. From the data collected we have estimated the eggs quantity losses in different cultivation stages and the offspring effectiveness which released in the lake, in the period of September - October. The laying eggs

apparatus in dark rooms, the constant water flow and the monitoring of temperature, pH, water purity showed optimal development conditions of eggs in the same way and as well as the tanks premises where the fingerlings grew until they weigh about 3 gram. Based on the observations and calculations we have done, we predicted the possible conditions of artificial fecundation, cultivation and conservation of Koran summer form, *Salmo letnica aestivalis*, that follows the same development stages as Koran winter form. In our work, a very important information has been obtained from several meetings with the old fishermen, to create a final screen of the Koran summer form catches. The fish catches declining of the *Salmo letnica aestivalis* amount, are a strong appeal to establish coordination and management mechanisms in its intensive conservation through the artificial fertilization and cultivation techniques that till now are used for the winter form cultivation.

RESULTS AND DISCUSSIONS

Figure 1 is a graph showing the quantity of Koran caught from licensed fishermen over the years. The Inspectorate of fishing in Pogradec possesses data from 1947 to 2013.

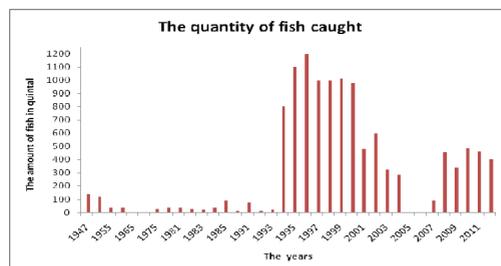


Figure 1. The annual quantity of Ohrid trout caught by the licensed fishermen in Albanian side

According to figures refer we notice a lower pace of the amount of fishing during the years 1947- 1993, ranging from 16 quintal up to 140 quintal koran per year. For 1965, 1970 and 2005 and 2006 there are no data on Koran catches amount for albanian side. If we see further in 1994 noticed a trend of increased amount of the Koran catches, which continues until 2000 and where the amount of fish caught varies from 800 to 1200 quintals per year. This

period, which discerns with the increased of Koran catches quantity, coincide with the important activity of the Koran cultivation impiant in Lin economy. So, the improving of technological equipment and eggs cultivating environments in this economy associated with a ranked production of 180 000 -700 000 fingerlings annually. In the following years and nowadays the amount of fingerling stage produced annually by this economy goes about 1 million fingerlings. Despite this, in the years 2002-2012 the amount of Koran catches comes declining with an annual quantity account of about 300- 480 quintal. The main reason for this decrease in the quantity of fish catches is the overfishing or abusive fishing of Koran. The number of unlicensed boats in recent years has come increased and consequently the activity of undeclared fish catches gives us lower values of the Koran catches amount . If we compare the data of the Koran captured in the Ohrid and Struga area, in recent years appear a decrease of fish caught amount (Spirkovski & Talevski, 2002). The highest quantity catches appear in the years 1987-1990 which coincides with an intensive activity on Ohrid trout cultivation by the Hydrobiological Institute of Ohrid. The followed years presented the need for a cross-border water management plan of the lake and the Lake Ohrid Conservation Project (LOCP) was the result of specialists discussions from both countries; Albania and Macedonia. Following the artificial fecundation and cultivation steps of Ohrid trout in Lin economy, in Pogradec, we concluded on the effectiveness of breeding techniques used by specialists. So, the embryonic mortality during the fertilized eggs incubation and the next steps is even lower depending on the apparatus used for laying eggs. The values vary from 5.5% in the groove form apparatus, 6.8% in the William apparatus and 8.3% in the Mc Donald apparatus. So the survival of the fertilized eggs until the fingerlings stage is 91.7% - 94.5%, that in the number language translates into about 1 million fingerlings issued annually in the lake. This Ohrid trout artificial cultivation economy, only proceed with his winter form with a considerable effectiveness that not only helps in the Koran conservation but also creates significant opportunities for fishing

quantities. Contacting the fishermans that have fished for decades in Lake Ohrid, we took the unanimous opinion of the reduction trend in the Koran summer form caught amount. The specialists of offspring cultivation in Lin economy, now with perennial experience, have the necessary potential to realised the possibility of applying the artificial cultivation also for the Koran summer form, *Salmo letnica aestivalis*.

CONCLUSIONS

By the quantitative data and the realised statistical processing we noted a link between the activity of Koran artificial breeding economy in Lin and the quantity of Koran caught by licensed fishermen. The development of fish conservation and cultivation techniques from this economy has led to increased efficiency of lake repopulation with fingerlings, which is presented by the growing trend of the fish caught amount.

By the fishermen data based on their activity for tens of years in the Lake Ohrid water, we conclude in the decrease of caught quantity of Koran summer form, *Salmo letnica aestivalis*. We suggest that the management and coordination of the artificial cultivation of *Salmo letnica aestivalis* will lead not only to the caught amount increase of this form, but also in its optimal conservation status.

The Koran cultivation impiant in Lin, Pogradec has the necessary specialists, experience and facilities in which it would could be realized the cultivation of Ohrid trout summer form, *Salmo letnica aestivalis* that today appears as a very important issue of its conservation.

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