

PhD Thesis Short Abstract

**ADVANCES IN STUDYING
THE BIOLOGY AND THE EXPLOITATION SYSTEM
OF STELLATE STURGEON (*Acipenser stellatus* Pallas 1771) DURING
THE REPRODUCTION MIGRATION IN THE LOWER DANUBE**

This thesis presents the results of a six years research project on the stellate sturgeon Danube's population during its reproduction migration. The study started following the reflection that despite the abrupt increase of human pressure (mainly fishing) on sturgeon stock in the Danube River after 1990, we have no recent population and biology data that would help the management of this valuable resource. Actually, the resource management resumed only to selling fishing licences and establishing rules (as for example minimal size of fish, prohibition periods, fishing gears restrictions) which were never respected due of the absence of a monitoring and control system.

The goal of the thesis was to gather as many data and information as possible, firstly to assess the exploitation status of the population and secondly to contribute to the knowledge on stellate sturgeon population and biology (migration, spawning, growth, physiology etc).

The number of samples was constrained by the decrease of the captures and especially by opacity of the exploitation system (lack of a monitoring of the captures, restricted access to the fishing areas, lack of resources for financing the research) (Ceapa and Bacalbasa 1998).

On 317 samples gathered during four years we calculated the growth rate, the length-weight relationships and the age composition for the two sexes brood fish during the reproduction migration (Ceapa et al. 2001). Comparing to the age frequencies for the 1965-1968 period we noticed an appreciable shift in the proportion of the age classes toward the youngest ones and a rejuvenation of the population. Nowadays the average age is of 7.2 years for the males and 10.9 years for the females, comparing with 10.2 and respectively 12.4 years in the 1965-1968 period. The average total length for the 1997-2000 period (mean TL=119,73 cm) is much smaller comparing to the 30 years earlier value (mean TL=131.16 cm). The maximum frequency age class was the 7th years class for the males and the 8th and 11th for the females, comparatively with the 8th and respectively 11th and 14th (Shubina, 1989) and 15th respectively 12-14th (Leonte & Pogârneață, 1963). Those data are classical expression of an overfishing.

The sturgeons are very sensitive to overexploitation. The increasing fishing effort may conceal the species decline by catching most of the spawners until all the cohorts are finished. As in may appear that the captures are growing, after a period of time close to the maturation period we will find out that the populations are gone. As there was no monitoring of the captures during the last decades, data on evolution of fishing effort are lacking. By interviewing the fishermen and research

in the "gray literature" we assessed the growth of the fishing effort on the Romanian part of the Danube of about 20 times in the last 30 years.

From the linear regression on the descending parts of the capture curves (obtained from age composition) for the data of 1997-2000 and 1965-1967 period respectively, we assessed the total mortality $Z = 0,105$ and respectively $Z = 0,0412$. The calculated total mortality is an indication of the increasing fishing pressure. The average rise of 2.5 times of the annual total mortality is a threat to the existence of the stellate sturgeon population in the nearest future.

Methods and biological material (specific VTG antibodies, purified VTG) were settled up in order to use them in studying the physiology of the spawners during the reproduction migration. Using them, original data concerning the VTG and the sex steroids plasma levels (testosterone (T), estradiol (E2), 11-keto-testosterone (11-KT), and $17\alpha,20\beta$ -dihydroxy-4-pregnen-3-one (DP)) were obtained on stellate sturgeon spawners during the reproduction migration in the lower Danube (Ceapa et al 2002).

We proved that the vitellogenesis is still undergoing during the reproduction migration. All the measured parameters and especially the low DP concentration suggest the spawning will occur after the end of May (date of our last fish sampling) and in upper spawning zones. The VTG presence in male plasma indicates a possible slight exposure to a xenobiotic effect in the Black Sea that may reduce the reproductive capacity of the male spawners. We confirmed by our data that the main sex steroids (T and 11KT) are involved in formation of migration behavior, being at high levels both in males and females during all the upstream migration.

The vitellogenin levels allowed us to perform an accurate identification of sex of the fishes and to demonstrate the supposition that the fishermen who are doing this by the morphological characteristics are wrong in an important proportion of the spawners. The sex identification is mistaken especially on the precocious females in first vitellogenesis (6-7 years old). The VTG as well as the ratios E2/T and E2/11KT discriminates the two sexes and their usage as a sex determination method could be considered for the wild populations.

As the access at the resource is rather difficult and the number of fishes is continuously decreasing, we have to try to obtain the maximum of information from the fishes that we catch and to use them for a better understanding and management of those valuable species. The methods and results obtained in this thesis could be used in the future in the setting up of a monitoring of the stellate sturgeon in the Danube and trying to evaluate the stocks.

Without an active involvement of the state authorities, without an agreement between all the riverine countries that have access at this valuable resource and without decisions and/or sanctions from the international conservation organisations (as for example CITES), in our opinion, the sturgeon species on Danube River are in great danger of extinction during the following years.