PRESENT STATE OF STURGEON STOCKS IN THE LOWER DANUBE RIVER, ROMANIA

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Introduction

Since always sturgeon fisheries in the lower Danube River and in the N-W Black Sea were considered extremly important for the countries of the region, involving important fishermen communities (Ambroz, 1960; Antipa, 1909, Bacalbasa-Dobrovici, 1999; Hensel & Holcik, 1997; Leonte, 1965; Reinartz, 2002, Suciu, 2002; Vassilev & Pehlivanov, 2003). After 1990, conservation and fisheries scientists in the region have been aware of threatened status of sturgeons (Banarescu, 1994; Bacalbasa-Dobrovici, 1991, 1997; Navodaru, 1999, Staras, 2000) and Ukraine even listed beluga sturgeons in their Red Data Book (Shcherbak, 1994). Since the listing in year 1998 of all species of Acipenseriformes in Appendix I & II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Wijnsteckers, 2003) conservation and fisheries of these species are undergoing a steadily developing process of joint regional management.

Two regional meetings on conservation and sustainable management of sturgeons under CITES regulations were organised in 2001 (Sofia, Bulgaria) (Anon. 2001) and 2003 (Tulcea, Romania) (Anon. 2003).

In order to enable communication among CITES and fisheries authorities of the region an e-mail dialogue working group, the Black Sea Sturgeon Management Action Group (BSSMAG) was established in October 2001, during the Sofia Meeting. This organism was the keystone of most of the progress achieved during the last 5 years, leading to the adoption of a Regional Strategy for the Conservation and Sustainable Management of Sturgeon Populations of the N-W Black Sea and Lower Danube River in accordance with CITES (Anon. 2003).

This paper presents the evolution of status of sturgeon stocks in the lower Danube River during 2001 – 2005, surveyed as requested by CITES Resolution 12.7 (rev. CoP 13), and the results which lead to the recent conservation regulations adopted by Romania (Anon. 2006).

Methods

The Regional Monitoring System (RMS), a guideline developed by BSSMAG Romania and agreed regionally in April 2002 was later included in the Regional Strategy (Anon. 2003). According to RMS, the assessment of non detrimental catch quotas and accordingly derived export quotas were based on two cathegories of information.

(i) Fishery dependent information (fishing company, date of capture, fishing site, type of fishing gear, species, number of commercial tag, sex, standard length - SL, total weight - TW, gonad weight – GW, name of fishermen) of all in Romania legally landed sturgeons were compulsory reported since 2001 by fishermen to fishery authorities in Tulcea and Bucharest. Since July 2003 these date were regularly posted on a specially designed Webpage (http://rosturgeons.danubedelta.org). Bony fin rays of both pectoral fins were collected by fishermen from sturgeons landed, were labelled with the number of commercial tag attched to the fish, were cool stored and sent to our Lab. After drying

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them, the age of fish was determined on crossections in one of the two bony fin rays. We plotted age class distribution / species & sexes using Microsoft Excel software.

(ii) Fishery independent information on downstream migration of young of the year (YOY) sturgeons born annually in the lower Danube River was monitored by us (Suciu, 2004a) using specially manufactured, 90 m long bottom trammel nets of 20 mm mesh size. These were drifted 3 - 4 times / day at River Km 119, five days / week, every second week, during May - July 2001 – 2003. A newly discovered procedure for predicting the timing of spawning of beluga sturgeons in the lower Danube River (Suciu. 2005b) enabled us since 2004 to refine the YOY monitoring procedure by shortening the duration of fishing from 3 month (May - July) to only one month (June and / or July). The results expressed in CPUE (number of YOY captured while drifting the net over a river bottom area of 8 ha, at water depth of 3 - 12 m) were used to plot juvenile production index (JPI) graphs (Fig.1).

In order to achieve a generational effective population size $N_{e(GEN)}$= 100 and an inbreeding rate / generation ΔF max = 0,50 % (Kincaid, 1993; ASMFC, 1996), the young sturgeons for the stocking programme which started in 2005 were produced by artificial propagation of an effective number of breeders captured alive from the wild, as foreseen in Annex A to the Regional Strategy (Anon. 2003). Young sturgeons were raised to an average length of 15 cm and tagged prior stocking using coded wire tags (CWT) by Northwest Marine Technologies (Solomon, 2005).

Results

Monitoring of effects of adopted catch quotas

The regular monitoring of downstream migration of young sturgeons at river Km 119 during the period of 2000 – 2005 demonstrated every year (Fig.1) the presence of YOY of each of the three diadromous species and of the freshwater residend sterlet.

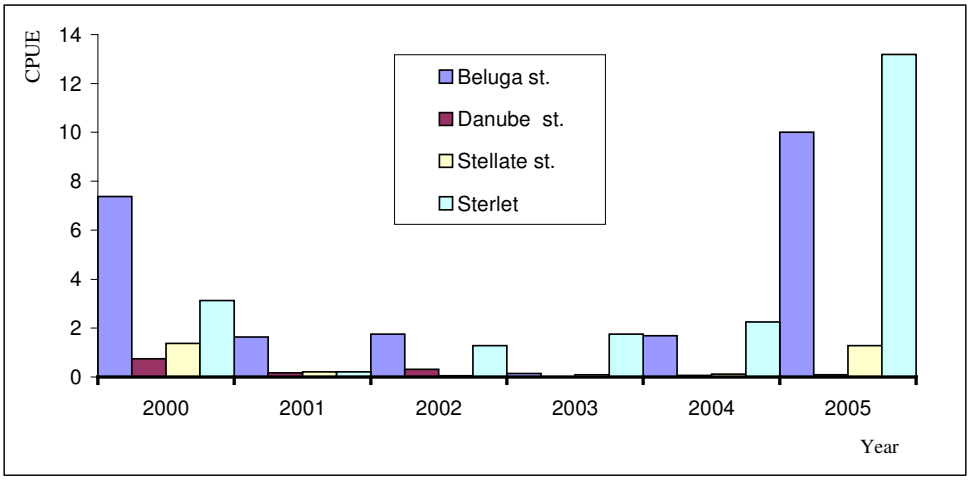

Figure 1: Juvenile Production Index (JPI) graph:
Natural recruitment of different sturgeon species in the lower Danube River during 2000 – 2005 assessed by monitoring downstream migration of YOY at River Km 119

Natural spawning and annual recruitment varied in beluga sturgeon (from 0.143 in 2003 to 10 in 2005) and sterlet (from 0.208 in 2001 to 13.18 in 2005) in natural limits and were alarmingly low in Danube sturgeon (not exceeding 0.7 recorded in year 2000) and stellate sturgeon (not exceeding 1.38 recorded in year 2000).

Age structure of adults monitored annually (Fig. 2) was used to evaluate the effects of adopted catch quota. We found that the age structure recorded in year 2003 in stellate sturgeon (Fig.2A) could be considered as relatively unaffected by fishery because first spawners (6 – 8 years old) were dominant (over 70%). Already in year 2003 age structures of Danube sturgeon (Fig.2B) and beluga sturgeon (Fig.2C & D) migrating for spawning in the Danube River were clearly lacking first time spawners (less than 5%).

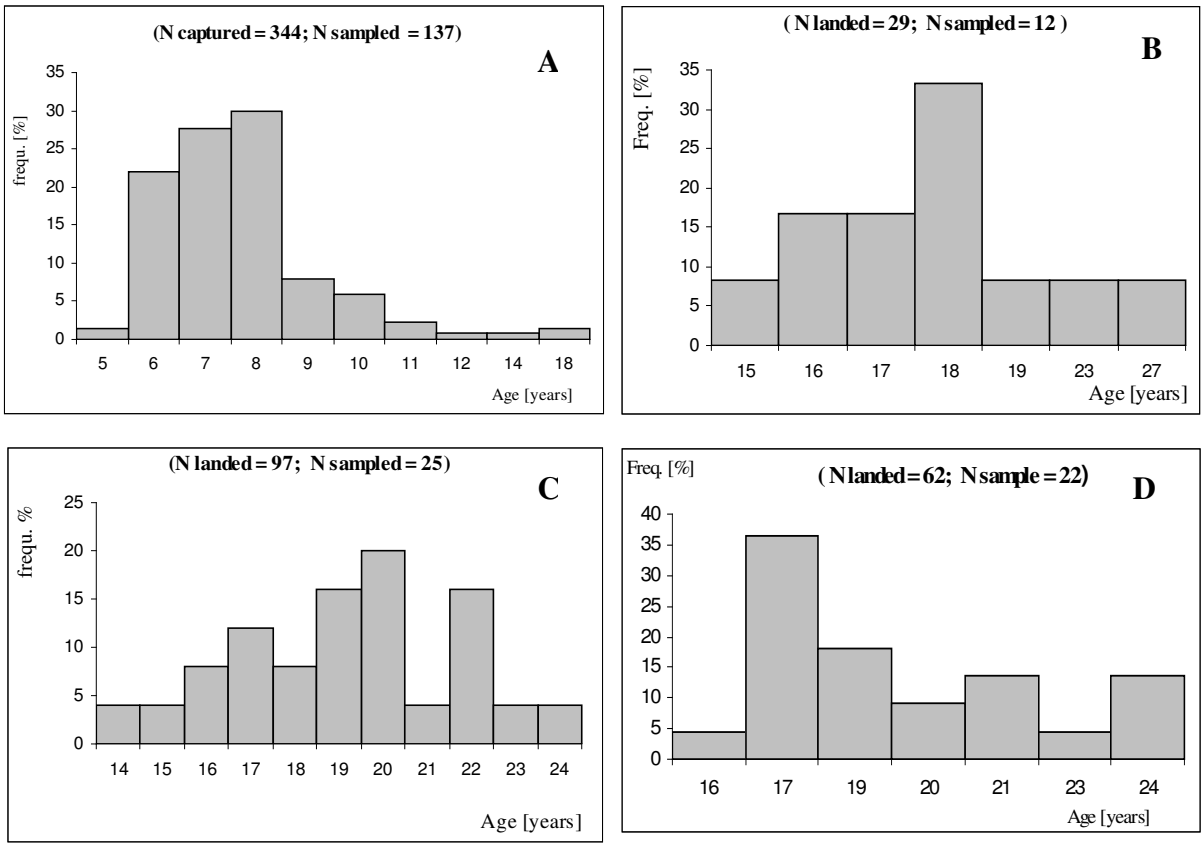

Figure 2: Age class frequencies in: A- stellate sturgeon males (2003); B – Danube sturgeon of mixed sexes (2003); C - beluga sturgeon of mixed sexes (2003) and D – beluga sturgeon females (2004) landed in Romania (years in parentheses)

Adaptive management

Following 11 years of poorly regulated fishing of sturgeons (1990 - 2000) (Bacalbasa-Dobrovici, 1997), during 2001 – 2005 Romanian fishery and CITES management authorities implemented adaptive management (Hilborn & Walters, 1992) of sturgeon stocks. This included setting of precautionary catch quota, reduction of number of fishing licenses (from 1040 to 540), compulsory marking and reporting of biometrics characteristics of all fishes landed (posted on Webpage since 2003). Catch quota was reduced from 56 tons in 2002 to 40 tons in 2005, while catches decreased from 37.5 tons to 11.8 tons.

Long-term evolution of populations

The long-term evolution of stocks in all sturgeon species is well represented by the example of beluga sturgeon captures recorded during 1920 – 2005 (Fig. 3).

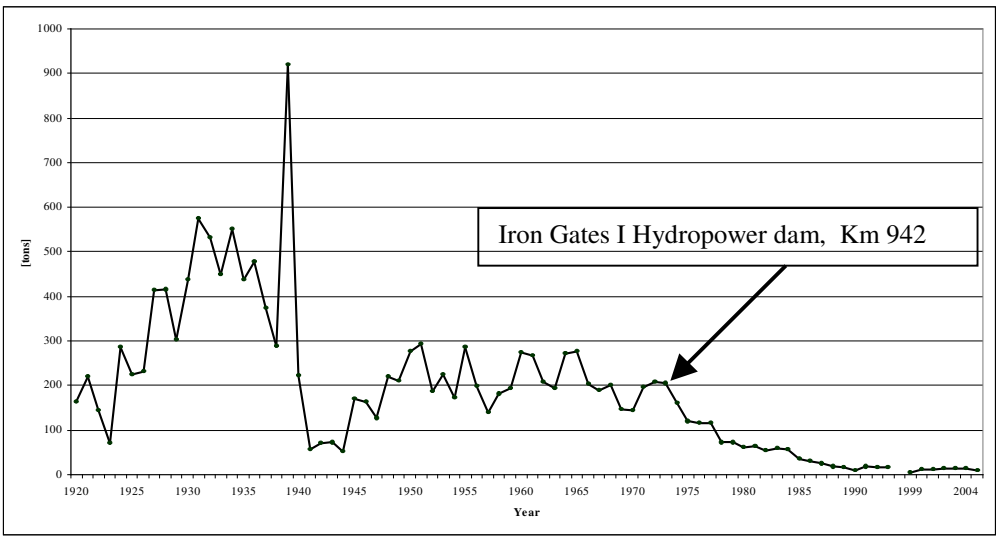

Figure 3: Catches of beluga sturgeon recorded in Romania during 1920 – 2005

The effect of damming the river in 1974 at Km 942 (Iron Gates I) was a decreasing of catches, from 200 tons in year 1974 to only 10 tons in year 2005.

Supportive stocking programme

Taking the risk of incomplete knowledge of genetic structure of populations (Kincaid, 1993; Ferguson, 2000; Suciu, 2001), low to medium level supportive stocking programmes (Cowx, 1998) started in year 2005 in stellate sturgeons and Danube sturgeons of our region, to compensate the effects of largely uncontrolled intensive fishing in Romania during 1990 – 2000, prior implementation of CITES regulations.

Ten thousand stellate sturgeons obtained by artificial propagation, using an effective number (N_e = 14) of broodfish which assures the preservation of genetic diversity, were raised to average TL of 15cm, individually tagged using CWT (Fig.4) and stocked at four different locations in the Danube River.

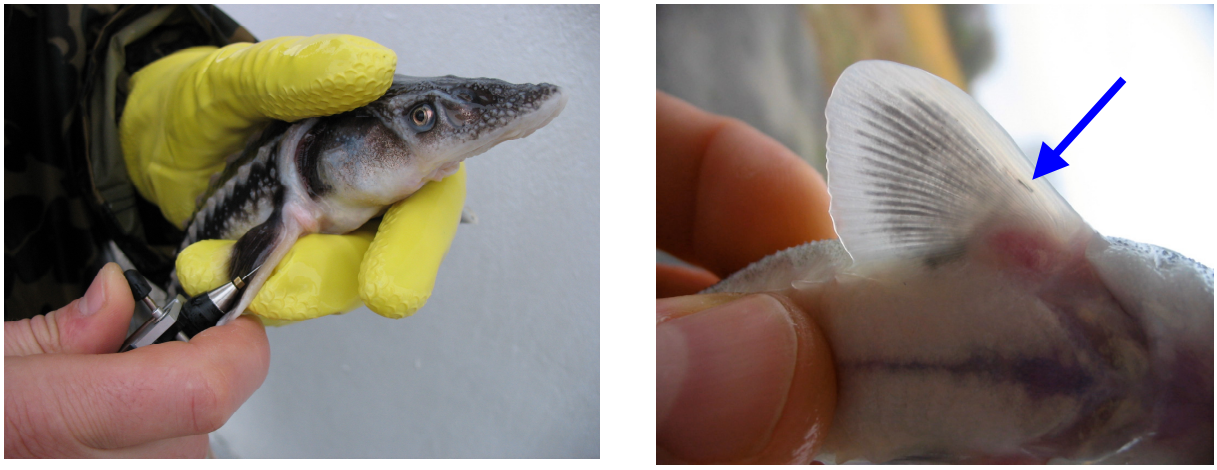

Figure 4: Tagging of a young Danube sturgeon and location (blue arrow) of Coded Wire Tag implanted in the pectoral fin of YOY stellate sturgeon stocked in the Danube River in 2005

Latest conservation regulations and development perspectives of sturgeon aquaculture

Lack of first time spawning Danube sturgeons recorded already since year 2003 and acute deficit of first time spawning beluga sturgeon since year 2004 made us to realize the need of recommending implementation of special conservation regulations. Despite having received

CITES catch and export quotas for year 2006, considering the multispecies character of traditional sturgeon fishery and the long-term evolution (1920 - 2005) of catches, in May 2006 the Romanian Authorities decided a 10 year ban of commercial fishing in all species of wild sturgeons (Anon. 2006).

Discussion

The phenomenon of disbalance in the age structure of spawning cohorts of Danube sturgeons visible already in year 2003 was not understood until the same situation happened repeatedly in beluga sturgeon in year 2004 and 2005.

Prior the implementation of RMS, in Romania there was an existing experience of monitoring the presence and distribution of young sturgeons in the Danube River (Leonte, 1959; Suciu, 1998). Similarily as assessed in other river systems (Nilo, 1997; Rochard, 2001) the abundance of YOY varied mostly due to natural environmental conditions (Suciu, 2005a), but also due to intensive overfishing after year 1990 (Navodaru, 1999) and poorly implemented fishing prohibition and catch quota enforcement.

The success of establishing for the first time a monitoring system of the abundance of YOY sturgeons in the Danube River determined the Romanian Authorities to support this activity by financing the construction of the Monitoring Station for Migratory Fish at Isaccea, River Km 100, scheduled to be finalized by July 2007 (Anon. 2006).

Summary

Recent evolution of sturgeon stocks of the N-W Black Sea and the lower Danube River has been surveyed using fishery independent (JPI) and fishery dependent (age structure) information. All data obtained showed that sturgeon stocks were critically disbalanced due to extreme overfishing during the period 1990 – 2000, prior implementation of CITES regulations. Consequently, in May 2006, conservation regulations have been adopted for a period of 10 years including improved supportive stocking programmes for stellate and Danube sturgeons.

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