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The Mohamed bin Zayed SPECIES CONSERVATION FUND

ILLEGAL CAVIAR TRADE IN BULGARIA AND ROMANIA

RESULTS OF A MARKET SURVEY ON TRADE IN CAVIAR FROM STURGEONS (ACIPENSERIDAE)

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EXECUTIVE SUMMARY

Overfishing and unsustainable trade in caviar from wild sturgeons have been identified as the major direct threats to sturgeons in the Danube – one of the last mainstays of these globally threatened fish[1]. In the two key range States of Danube sturgeons, Romania and Bulgaria, both fishing and domestic trade in caviar from wild sturgeons are now illegal, due to general moratoria lasting until the end of 2015. However, there are unconfirmed reports that poaching continues there.

The aim of this report is to provide research findings from a survey of caviar trade in Bulgaria and Romania, with a special focus on illegal trade as well as on illegal fishing of sturgeons. The goals of the survey were to collect reliable data and provide clear indications as to whether illegal caviar is available in Bulgaria and Romania in order to support the actions of national authorities controlling fishing and trade.

The survey adds to Objective 6 of the "Action Plan for the conservation of sturgeons (*Acipenseridae*) in the Danube River Basin" in that it aims to investigate the trade in caviar including the chain of custody from fishermen to restaurant sellers and exporters of products (Action 6.5) and the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) universal caviar labelling system (Action 6.3)[1].

The project involved local surveyors visiting selected shops, restaurants, markets, street vendors and sturgeon farms in different parts of the two countries in order to buy caviar. The survey took place from April 2011 to February 2012, with a special focus on times of peak supply or demand (e.g. spring and autumn migration times for wild caviar; Christmas and New Year). Samples were obtained from vendors and then the DNA analysed to determine the species of origin.

Overall, the findings of the survey suggest that illegal fishing of sturgeons and illegal trade in caviar continues in both Romania and Bulgaria in spite of the moratoria.

In total, 30 samples of caviar were collected: 14 in Bulgaria, 14 in Romania and 2 of Bulgarian farmed caviar in Austria. A summary table of results appears below. The key research results are as follows:

[1] Bloesch, J., Jones, T., Reinartz, R. & Striebel, B. (2002) Action Plan for the conservation of sturgeons (Acipenseridae) in the Danube River Basin. Nature and environment, No. 144, Council of Europe Publishing, 112pp
http://www.iad.gs/docs/reports/SAP.pdf?PHPSESSID=708652a79156332ebc5be9657f0d43b6

- Six samples were shown not to be sturgeon caviar, despite being explicitly sold as such
- Five samples were declared by vendors to be wild-caught (and therefore illegal); four of these five samples were shown by DNA testing to be from the highly sought-after and endangered Beluga Sturgeon (*Huso huso*)
- Eight samples did not have mandatory CITES labels with CITES codes (excluding restaurants, where the container with the label is not expected to be on display); only two of these were in fact caviar from sturgeon (which was said to be wild-caught)
- Three samples were from sturgeon, but DNA analyses suggested they were from species or hybrids other than those declared on the label
- Five samples were mixes containing more than one species of sturgeon, which is only legitimate for "pressed caviar"[2]

These cases demonstrate clear contraventions of CITES labelling provisions and the European Union Wildlife Trade Regulations. In addition they suggest that caviar of wild sturgeons is offered for sale.

In addition to these results, important qualitative information on illegal fishing and trade was acquired through the survey. Bulgarian fishermen told surveyors that they used modern equipment such as sonar and GPS as well as forbidden traditional hook lines ("carmaci") to catch wild sturgeon. During the course of the project surveyors also found a tendency amongst some vendors in both countries, especially those offering supposedly illegal caviar, to only sell to people they trusted. The result is a covert chain of custody from poachers to customers.

The results of this survey underline how crucial effective law enforcement in these two important sturgeon range States is. This should include strong interagency and transborder coordination and employment of modern technology such as DNA analysis. The issue of illegal sturgeon fishing and caviar trade deserves more attention and also firm political support in order to make the efforts undertaken by Romania and Bulgaria to protect their native sturgeons successful and ensure a future for sturgeons in the Danube.

The report formulates a number of recommendations aiming to address the issues identified by the project.

[2] CITES Resolution Conf. 12.7 (Rev. CoP14): Conservation of and trade in sturgeons and paddlefish http://www.cites.org/eng/res/all/12/E12-07R14.pdf

SUMMARY RESULTS TABLE

Country	No. of sites visited	No. of sites selling alleged caviar	No. of samples purchased		Price range per gram in Euros	Species of origin indicated by DNA testing	CITES label visible?	Where label not present, did vendor indicate wild?	Where label visible, did the species code correlate with DNA testing?
Romania	38	15	14	Restaurants (5)	0.30 – 4.00	Sturgeon (8)	Yes (3)	N.R.	Yes (1)
				Individual vendors (3)					DNA results inconclusive (1)
									Unknown (1)[ii]
				Shops (3)		Not sturgeon caviar (3; all from a market stall)[i]	No (11)	Yes (5 restaurants/ vendors)[iii]	N.R.
				Market stalls (3)		No results from DNA analysis (3)		No (6)	
Bulgaria	41	14	14	Restaurants (2)	0.10 – 2.67	Sturgeon (11)	Yes (10)	N.R.	Yes (8)
				Sturgeon Farms (4)		Not sturgeon caviar (1,from a restaurant)[iv]			No (2)[v]
				Shops (8)		Not sturgeon caviar (2,both from fish shops)[vi]	No (4)	No (4)	N.R.
Austria	1	1	2	Shop (2)	3.14 – 4.20	Sturgeon (2)	Yes (2)	N.R.	DNA results inconclusive, but probably no (1)[vii]
									No (1)[viii]

[i] Sturgeon DNA present but product not fish eggs; potentially made from sturgeon meat and other material

[ii] CITES label was visible, but the exact species code was illegible so it is unknown whether the species label correlated with the DNA results or not

[iii] Sturgeon fishing is currently banned in Romania, so if true, this would indicate illegally sourced caviar

[iv] Eggs from Lumpfish *(Cyclopterus lumpus)*

[v] One of these samples was labelled as Amur Sturgeon *(Acipenser schrenckii)*, but DNA analysis showed Kaluga Sturgeon *(Huso dauricus)* as maternal species of origin. The other sample was labelled as Russian Sturgeon *(A. gueldenstaedtii)* but results showed a combination of more than one sturgeon species (Russian/Persian/Adriatic Sturgeon and at least one other)

[vi] No DNA traceable, product not fish eggs; artificially produced from unknown materials

[vii] Product was labelled as from Beluga Sturgeon *(Huso huso)* but DNA results pointed to Siberian/Russian Sturgeon as species of origin. However, results were too poor to allow a secure species identificationother)

[iv] Product was labelled as from a Stellate Sturgeon *(A. stellatus)* but DNA analysis indicated that the caviar was in fact from Siberian/Russian Sturgeon

1. INTRODUCTION

1.1 CONSERVATION STATUS OF DANUBE STURGEONS

Caviar, the unfertilized roe of sturgeons, is one of the most valuable wildlife commodities. This has led to heavy overexploitation and a dramatic decline of sturgeons worldwide. According to the most recent International Union for Conservation of Nature (IUCN) assessments in 2009, the population of sturgeon has significantly declined with sturgeons now considered the most Critically Endangered group of species worldwide[3].

The Black Sea and Danube River Basin are among the last regions with viable populations of sturgeons. However, even there, historic patterns of fishing yields reveal drastically declining numbers. In Bulgaria, total annual catches fell from 63.5 tonnes in the 1940s to 25.3 tonnes in 1995-2002[4]. In Romania – with the Danube delta as a key fishing area – total annual catches fell from approximately 1144 tonnes in 1940 to less than 8 tonnes in 1995[5]. A century ago, six species of the ancient fish were native to the Danube: Beluga Sturgeon (*Huso huso*), Stellate Sturgeon (*Acipenser stellatus*), Russian Sturgeon (*A. gueldenstaedtii*), Sterlet (*A. ruthenus*), Ship Sturgeon (*A. nudiventris*) and European Sturgeon (*A. sturio*). Five of them are now classified by IUCN as Critically Endangered - with European Sturgeon already extinct in the Danube and Ship Sturgeon extremely rare. Sterlet (*A. ruthenus*) has been assessed as Vulnerable.

The Action Plan for the conservation of sturgeons in the Danube River Basin[1] lists the following as the main threats to the survival of Danube sturgeons:

- Overfishing
- Disruption of migration routes caused by dams
- Loss of spawning habitats due to river regulations

[3] http://www.iucn.org/iyb/about/species_on_the_brink/?4928/Sturgeon-more-critically-endangered-than-any-other-group-of-species;

http://cmsdata.iucn.org/downloads/species__status_and_population_trend_of_sturgeon_on_the_red_list.pdf

[4] Vassilev M., Pehlivanov L. (2003): Structural Changes of Sturgeon Catches in the Bulgarian Danube Section. Acta zool. Bulg., 55 (3), 97-102

[5] Novadura (1999) in Reinartz R. (2002): Sturgeons in the Danube River – Biology, Status, Conservation. Report for the International Association for Danube Research, 150pp

As a reaction to declining numbers Romania issued a 10-year catch and trade ban on wild sturgeons in 2006. Bulgaria in 2011 followed with a similar, but annual ban, extending the ban in 2012 for a further four years. This means both the Bulgarian and Romanian bans end in 2015.

Despite the bans illegal fishing remains the greatest direct threat to the survival of wild sturgeons in the Danube River Basin. The main driver is the very high economic value of caviar. Additionally sturgeon meat is in demand as a delicacy and achieves higher prices than that of any other local fish species. Sturgeons are especially vulnerable to overfishing. Due to their long life cycles and late maturity stocks take many years to recover. In addition, periodic spawning migration enables targeted fishing of aggregating mature animals[1].

Romania and Bulgaria share the major part of the lower Danube River, the last remaining spawning ground for most Danube sturgeons (see maps in Appendix 5.1 and 5.2). These two States therefore face a great responsibility for the conservation of sturgeon. Romania and Bulgaria are also the only European Union (EU) Member States that are potential source countries for wild caviar. Until relatively recently, the two Danube States were among the worlds' top-10 caviar exporting countries[6]. The area is also on a potential trade route for caviar – both legal and illegal – from the Caspian Sea to other EU Member States.

Despite the Critically Endangered status of sturgeons and the ongoing threat of overfishing, the Danube and Black Sea region is still a very important habitat for sturgeons. The World Sturgeon Conservation Society cites the Danube as the only large river system in Europe where the protection of existing but dwindling sturgeon stocks is still possible[1].

***A. stellatus* from sturgeon farming.**

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[6] Engler M., Knapp A. (2008): Briefing On the Evolution of the Caviar Trade and Range State Implementation of Resolution Conf. 12.7 (Rev. Cop 14). TRAFFIC Europe for the European Commission, 41pp+Annex

http://ec.europa.eu/environment/cites/reports_en.htm

1.2 CITES REGULATIONS REGARDING TRADE IN CAVIAR

All 27 species of sturgeons and paddlefish have been listed in the Appendices of CITES since 1998. Two species – the European Sturgeon (*Acipenser sturio*) and the Shortnose Sturgeon (*Acipenser brevirostrum*) – are listed in Appendix I of the Convention (and Annex A of the corresponding EU wildlife trade regulations), which prohibits any international commercial trade in wild-taken specimens. All other species are listed in Appendix II (and Annex B of the EU Wildlife Trade Regulations), and international trade is regulated through a system of permits, issued by national CITES Management Authorities[7]. All species of sturgeon and paddlefish are covered by CITES, regardless if wild caught or captive bred. This includes all parts and products, including caviar, meat, fingerlings, fertilized eggs, etc.

Any international shipments of these products must therefore always be accompanied by the appropriate CITES permits, issued by the relevant national CITES Management Authorities. The only exception is for amounts of up to 125 gram of (Annex B) sturgeon caviar per person, the import/export of which does not require permits if it is considered as personal effects (i.e. legally acquired, personally owned for non-commercial purposes and carried in personal baggage at the time of import/export); however, CITES labelling of caviar containers is still mandatory (see Chapter 1.6)[8, 9]. Shipments of (Annex B) sturgeon caviar within the EU do not require CITES documents – but do require CITES labels – as the EU is a common market and trade is therefore considered as domestic.

For wild sturgeon species from shared stocks (e.g. North-West Black Sea and Lower Danube river), yearly export quotas need to be set for caviar and meat in accordance with the procedure approved by the Conference of the Parties to CITES. A quota year starts on 1st March and ends on the last day of February of the following year[2]. Throughout the duration of this market survey, from April 2011 to February 2012, zero global export quotas for products from wild sturgeons were established, with the exception of a few kilograms of fertilized eggs of source "F" from Romania[10] (i.e. from a female born in captivity and where at least one parent originated in the wild[2]). This means that no international trade in caviar or meat from wild sturgeons was allowed.

[7] Council Regulation (EC) No 338/97, amended by Regulation (EC) No 101/2012
http://ec.europa.eu/environment/cites/legislation_en.htm

[8] Conf. 13.7 (Rev. CoP14) Control of trade in personal and household effects
http://www.cites.org/eng/res/13/13-07R14C15.php

[9] Commission Regulation (EC) No 865/2006, amended by Regulation (EC) No 100/2008
http://ec.europa.eu/environment/cites/legislation_en.htm

[10] CITES Sturgeon Quotas 2011 http://www.cites.org/common/quotas/2011/SturgeonQuotas2011.pdf

At the time of writing and during the time of the survey, only caviar from captive-bred (= source "C") sturgeons could be legally traded. With respect to CITES, "captive-bred" or "bred in captivity" means that both parents of the female were already born in captivity[2, 9].

Caviar processing and (re-)packaging plants, including caviar producing aquaculture operations, as well as exporters need to be licensed by the Management Authority of CITES member countries in order to be allowed to process, (re-)package or export caviar. These companies are required to maintain adequate records of the quantities of caviar imported, exported, produced, stored, etc.[9]

A unique registration code must be attributed to each such processing or (re-)packaging plant by that Management Authority. This registration code is part of the mandatory CITES caviar labels (see Chapter 1.6)[9].

1.3 CAVIAR LABELLING REGULATIONS

Following the adoption of guidelines for a universal caviar labelling system by all CITES parties[2], in 2006 the European Union (EU) adopted Commission Regulation (EC) No 865/2006, as amended, which has made the labelling of all caviar containers obligatory in all EU Member States[9]. As a result, all caviar containers in the EU market, regardless of their size, are required to bear a CITES label. The caviar labelling system is designed to help governments, traders and consumers in distinguishing legal caviar in trade from illegal caviar and aims to ensure that all caviar entering the market is from legal sources[11].

All sturgeon caviar containers, including tins, jars or boxes regardless of their size (including less than 125 gram, which can be imported without CITES permits – see Chapter 1.5), have to bear a non-reusable label with details about the source and the country of origin of the caviar. This applies to caviar from all sturgeon species (including hybrids), from wild as well as farmed origin, to commercial as well as non-commercial purposes, and to domestic as well as international trade. The non-reusable label is to be affixed by a processing or (re-)packaging plant. The label must either seal the container or the caviar must be packaged in such a manner as to permit visual evidence of any opening of the container, and it must not be possible to remove it undamaged or transfer it to another container[2, 11].

[11] TRAFFIC factsheet "Universal caviar labelling requirements"
http://www.traffic.org/species-reports/caviar-factsheet-english-1.pdf

This regulation is directly applicable in all EU Member States, and they must ensure that all caviar containers placed on the domestic market, whether produced or processed on their territory or imported, are labelled accordingly[11].

The label for caviar containers must include the following information:

1. Standard species code (three-letter code for the identification of sturgeon species, hybrids and mixed species; "HUS", for example, is the standard species code for Beluga Sturgeon (*Huso huso*) – see list of species codes in Annex 5.3);

2. Source code of the caviar ("W" for sturgeon harvested from the wild; "C" for captive-bred sturgeon; "F" for caviar produced from a female born in captivity and where at least one parent originated in the wild);

3. Code for the country of origin (two-letter ISO code);

4. Year of harvest;

5. Official registration code of the processing plant (each exporting country should establish a national registration system for processing plants, with official registration codes assigned to each plant);and

6. Lot identification number (caviar tracking system used by the processing or (re-)packaging plant)[2, 11]

Figure 1: Example of a CITES label with CITES code

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BAE – standard species code: Siberian Sturgeon (*Acipenser baerii*)
C – captive-bred
AT – country of origin: Austria
2009 – year of harvest
0001 – registration code of the processing plant
0076 – lot identification number

All containers in which caviar is repackaged must also be affixed with a label meeting all the above criteria. The label on repackaged caviar should allow authorities to trace the origin of the caviar, i.e. include the country code of both the country of origin and of (re-)packaging[2].

There is evidence that labelling requirements (non-reusable; sealing the container or allowing visual evidence of any opening) are not always met and cases of forged labels have been reported by some EU Member States[12, 13].

The use of DNA analysis has shown that considerable amounts of mislabelled caviar have been available for purchase[14]. Investigations in the New York City area in the mid-1990s demonstrated, that out of 95 samples of commercially available caviar, 23% were mislabelled with respect to species identification[15]. The survey was repeated in 2006-2008, with 90 caviar samples bought in shops and from web retailers in the USA[16]. This study found a decrease in cases of mislabelling, but 10% were still mislabelled, all of them from online purchase.

[12] Knapp A., Kitschke C., von Meibom S. (eds.) (2006): Proceedings of the International Sturgeon Enforcement Workshop to Combat Illegal Trade in Caviar. TRAFFIC Europe for the European Commission, 145pp+Annex

http://www.traffic.org/species-reports/traffic_species_fish14.pdf

[13] Knapp A. (2008): An assessment of the implementation of caviar labelling and licensing provisions in the European Union. TRAFFIC Europe for the European Commission, 61pp

http://ec.europa.eu/environment/cites/pdf/studies/caviar_labelling.pdf

[14] Genetische Tests können Kaviarschmuggel aufdecken – Workshop Leibniz Institute for Zoo and Wildlife Research. Verbundjournal Dezember 2006, 14-15

http://www.fv-berlin.de/oeffentlichkeitsarbeit/verbundjournal-1/pdfs/verbund68.pdf

[15] Birstein V.J., Doukakis P., Sorkin B., DeSalle R. (1998): Population Aggregation Analysis of Three Caviar-Producing Species of Sturgeons and Implications for the Species Identification of Black Caviar. Conservation Biology, 766-775

https://www.google.com/url?q=http://cmbc.ucsd.edu/Students/Current_Students/MCBP/ConsBiol%2520Birstein%2520et%2520al.pdf&sa=U&ei=n1gRUKusMYfxsgb9voDIAg&ved=0CAUQFjAA&client=internal-uds-cse&usg=AFQjCNESnpYdtPcTdNmCKOHtQYqED_w0XA

[16] Doukakis P., Pikitch E.K., Rothschild A., DeSalle R., Amato G., Kolokotronis S.-O. (2012): Testing the Effectiveness of an International Conservation Agreement - Marketplace Forensics and CITES Caviar Trade Regulation. PLoS ONE Volume 7, issue 7, 1-9

http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0040907

1.4 THE CAVIAR TRADE FROM BULGARIA AND ROMANIA

Prior to the sturgeon fishing ban, both countries were major exporters of caviar. According to the CITES trade database Bulgaria reported legal exports of over 20 000 kg of caviar and Romania over 26 000 kg between 1998 and 2008. In Romania, caviar was mostly of wild origin, with amounts gradually decreasing after a peak in 2000, going down to zero in 2006, when the moratorium started. Bulgaria's exports fluctuated between 1998 and 2005 and peaked in 2006, due to an increase of farmed caviar[17]. After Bulgaria's and Romania's accession to the EU in 2007, trade to other EU Member States – among them the main consumers of caviar – was no longer recorded in the CITES trade database, as it no longer counted as international trade.

1.5 STURGEON FARMING AND CAVIAR PRODUCTION

Sturgeon farming is a fast growing sector in the region and worldwide[18]. Reported international trade in caviar from aquaculture has significantly increased, often doubling from year to year, while worldwide imports of wild caviar have declined sharply since 1999[6]. Export data of farmed caviar from Bulgaria show a rapid growth, starting in 2002 with 100 kg and reaching over 3000 kg in 2006[17], the last year of data collection before Bulgaria acceded to the EU in 2007 and exports from Bulgaria to other EU Member States was no longer reported.

Aquaculture caviar production requires high investment and has a long payback time until the fish mature and caviar can be harvested. It takes at least six years for females of Siberian Sturgeon (*Acipenser baerii*) to reach sexual maturity, and more than double that for Beluga Sturgeon (*Huso huso*). As females are usually killed to obtain the caviar, revenues are made only once per adult female sturgeon.

If operating in accordance with nature conservation measures (e.g. legal acquisition of broodstock, preventing escape of hybrids or exotic species), the aquaculture industry can be positive both for local livelihoods and for wild sturgeons because it can meet the demand for caviar without exploiting natural populations. Yet the aquaculture industry also poses risks to wild sturgeons. In recent years concerns have been expressed that aquaculture operations may be involved in "laundering" wild sturgeons and caviar[12]. In Romania, there are allegations that illegally sourced

[17] Kecse-Nagy, K. (2011): Trade in Sturgeon Caviar in Bulgaria and Romania – overview of reported trade in caviar, 1998-2008.

http://www.traffic.org/species-reports/traffic_species_fish47.pdf

[18] National Strategic Plan for Fisheries and Aquaculture 2007-2013, National Agency for Fisheries and Aquaculture, Ministry of Agriculture and Forestry, Bulgaria

sturgeons are kept as broodstock and that wild sturgeons caught legally for breeding purposes are not released again but unlawfully retained in farms and even killed to sell their caviar[19]. Hubenova "*et al.*" (2009)[20] stated for Bulgaria that the "regime hides in itself the real danger for selling at the market caviar from wild fish populations, which have been presented as produced in the fish farm". DNA tests of caviar purchased in the New York City area in the survey of Birstein "*et al.*" (1998)[15] revealed that mislabelled higher-priced caviar was fraudulently sold as a lower-quality product; e.g. two samples labelled as "American sturgeon" and one labeled as "Sevruga caviar" (from *Acipenser stellatus*) were in fact much more costly Beluga Sturgeon (*Huso huso*) caviar. For a sample labelled as caviar from Siberian Sturgeon (*Acipenser baerii*) – the most common sturgeon in aquaculture – DNA analysis showed that it was actually from Russian or Adriatic Sturgeon (*Acipenser gueldenstaedtii* or *A. naccarii*). The authors of the survey have interpreted these cases of replacement of commercial species (indicated on the label) with endangered species (proven by DNA analysis) as a potential instance where a wild– probably illegally harvested – product was falsely sold as a product from aquaculture.

There have been allegations that aquaculture operations in the Danube region may be involved in the "laundering" of wild caviar originating from the Caspian region, and it is possible that this also happens with caviar from illegally caught Danube sturgeons. Preliminary results of organized crime investigations in Germany found that caviar labelled as from Bulgarian aquaculture was actually proven to have originated from the Caspian Sea[17].

1.5.1 STURGEON AQUACULTURE AND CAVIAR PRODUCTION IN ROMANIA

In Romania, sturgeon aquaculture has a rather short history[21]. The first successful artificial propagation of Beluga Sturgeons was achieved in 2004 at Isaccea. The same company opened a sturgeon growing farm on Lake Horia in 2009. In 2006, the second private sturgeon hatchery was constructed at Tamadau[22]. According to Suciu (2011), sturgeons are now farmed in more than ten locations in Romania.

[19] http://www.romanialibera.ro/exclusiv-rl/investigatii/braconierii-de-sturioni-platiti-de-statul-roman-134370.html; http://www.romanialibera.ro/exclusiv-rl/investigatii/batalia-sturionilor-48251.html

[20] Hubenova T., Uzunova E., Zaikov A. (2009): Management strategies in protection and restoration of sturgeon biodiversity in Bulgaria. Proceedings "IV INTERNATIONAL CONFERENCE FISHERY" Belgrade May, 27 – 29. 2009; 39-52

[21] Suciu R. (2008): Sturgeons of the NW Black Sea and Lower Danube River countries. NDF Workshop Case Studies WG 8, Case Study 5, 26 pp

[22] Suciu R. (2011): Present state of sturgeon stocks in the Lower Danube River, Romania. First International Conference on Conservation, Recovery and Sustainable Use of Danube River Sturgeons, 13 pp

The most popular species in Romanian sturgeon farms are Stellate Sturgeon (*Acipenser stellatus*), Russian Sturgeon (*A. gueldenstaedtii*), Beluga Sturgeon (*Huso huso*) and Sterlet (*A. ruthenus*)[23].

At the time of writing, four companies are listed on the CITES website as licensed exporters and/or processing and repackaging plants[24].

Table 1: Romanian companies registered as licensed exporters and processing and repackaging plants for specimens of sturgeon and paddlefish species (April 2013)

Company name	Address	Registered as exporter	Registered as processing/ repackaging (incl. caviar producing) operation
SC Aquarom Elite Distributions SRL	Praga Str. No. 7, sector 1, Bucharest	✔	✔
SC Delta Fish Distribution 2003 SRL	Soldat Nitu Ene str. No. 92B, sector 2 Bucharest Registered Office: Prelungirea Ghencea str. No. 93L, sector 6, Bucharest	✔	✔
SC INTERFRIG SRL	Cataloi Village, Tulcea County	✔	✔
SC Kaviar House Bucuresti Filiala Tulcea	Facility address: Horia village, Tulcea County Company address: Câmpia Libertătii str. no. 89bis, Isaccea, Tulcea County	✔	✔

Up to the end of the market survey period (i.e. February 2012), those companies produced sturgeons, fingerlings, fertilized eggs and meat but had not yet harvested, processed or traded caviar. Caviar from Romanian aquaculture is now on the market, with trade starting in December 2012 (Radu Suciu, pers.comm., January 2013).

[23] Smederevac-Lalić M., Jarić I., Višnjić-Jeftić Ž., Skorić S., Cvijanović G., Gačić Z., Lenhardt M. (2011): Management approaches and aquaculture of sturgeons in the Lower Danube region countries. J. Appl. Ichthyol. 27 (Suppl. 3), 94-100

[24] CITES register of licensed exporters and of processing and repackaging plants for specimens of sturgeon and paddlefish species

http://www.cites.org/cms/public/common/resources/reg_caviar.pdf

1.5.2 STURGEON AQUACULTURE AND CAVIAR PRODUCTION IN BULGARIA

In Bulgaria, sturgeon aquaculture for the production of meat and caviar started in 1995 when the first sturgeon farm was set up close to Plovdiv. In 2001, a second sturgeon farm was established close to Vidin on the Danube[20]. Sturgeons are produced from ponds and net-cage farms[25]. They are bred for meat (mainly for the domestic market) and caviar (mainly for export). Sturgeon farming is now the fastest growing sector in regional aquaculture[18]. The main species in aquaculture are Russian Sturgeon (*Acipenser gueldenstaedtii*), followed by Siberian Sturgeon (*A. baerii*) and hybrids of those, Beluga Sturgeon (*Huso huso*) and Sterlet (*A. ruthenus*)[18, 23]. By 2003, the Bulgarian Sturgeon Action Plan stated that the trade of sturgeon meat was expanding rapidly in Bulgaria and that sturgeon meat from aquaculture could be found in nearly every shop or supermarket in the country[26].

Caviar production in Bulgaria has shown a constant growth and has reached a yearly production of over six tonnes. The Tchobanov company is the major producer, especially of Russian Sturgeons (*Acipenser gueldenstaedtii*), with a reported production of five tonnes in 2011[27].

Most farmed caviar is sold outside of the country. However, there is imported farmed caviar for sale in Bulgaria, originating from a range of countries such as Italy, Germany and China[27].

Six companies in Bulgaria are registered on the CITES website as licensed exporters, processing and repackaging plants (including caviar producing aquaculture operations)[24].

[25] Kissiov I. (2010): Bulgaria - Aquaculture sector shows strong growth. Eurofish Magazine 6/2010, 21-29

[26] Jivkov (2003): Action plan on conservation of sturgeons in the Bulgarian aquatories of the Danube river and the Black Sea, 25pp

[27] according to information gathered by survey teams

Table 2: Bulgarian companies registered as licensed exporters and processing and repackaging plants for specimens of sturgeon and paddlefish species (April 2013)

Company name	Address	Registered as exporter	Registered as processing/ repackaging (incl. caviar producing) operation
Agamemnon I Ltd.	9, Europe Blvd, Sofia 2113002	✔	✔
Aqua Beluga Ltd.	10, Georgi Kondolov Str., Kurdjali	✔	✔
Beluga Inc. Vidin	South Industrial Zone, 3700 Vidin		✔
ET FANI-Miroslav Shopov	34, Osmi mart Str., Kurdjali	✔	✔
Oscietre Commerce Ltd.	4114 Boliartzi, Reg. Plovdiv		✔
Parpen Tchobanov Ltd.	4114 Boliartzi, Reg. Plovdiv		✔

1.6 ILLEGAL FISHING AND TRADE IN STURGEONS AND CAVIAR IN/ FROM ROMANIA AND BULGARIA

Data regarding the illegal trade in sturgeons and caviar is naturally difficult to collect. However, a number of sources cite illegal fishing as an ongoing threat to sturgeon in the Danube. Bacalbasa-Dobrovici and Patriche (1999)[1] and Vassilev and Pehlivanov (2003)[4] see illegal or unreported fishing as a major threat to sturgeon in the Lower Danube region, at that time exceeding by far legal catches. Hubenova *et al.*[20] state in 2009 that the different regulatory instruments set up by Bulgarian authorities at that time (gear restrictions, minimum size requirements, close seasons) have not been sufficient to achieve the desired effect on the status of sturgeon populations. A "considerable delay in the

[28] Irinel Surugiu, National Customs Authority Romania: presentation at Sturgeon Enforcement Workshop, 27-29 June 2006 in Brussels

implementation of these measures" is seen as a main reason for this. The authors postulate that a moratorium can only be efficient if poaching can be terminated. However, they expressed concern that poaching would continue in Bulgaria beyond a ban for a number of reasons e.g. insufficient number of staff and financial means for controls and a lack of adequate labelling of caviar. The Bulgarian National Strategic Plan for Fisheries and Aquaculture[18] mentions illegal fishing of many types of fish, not just sturgeons, as a problem in Bulgaria, estimating it to equal the quantity of fish caught legally.

As a study of seizure data between 2000 and 2009 showed, no cases of illegal caviar trade were reported by Romania and Bulgaria in this ten-year period, while there were 14 cases reported by other EU Member States (Austria, France, Germany, Hungary, Italy, and the Netherlands) with Romania and Bulgaria implicated[17].

However, there are relevant seizures in both countries, which did not concern caviar, or took place after the timeframe of the present study:

Romanian authorities seized two large shipments of sturgeon meat in 2005:

- 204.5 kg of sturgeon meat from Italy was confiscated at Customs of Baneasa airport in Bucharest in April 2005 and destroyed
- 210 kg of sturgeon meat from Poland was confiscated at Arad Regional Customs – on the border with Hungary – in August 2005, and a fine of RON 2500 was imposed[28].

These seizures followed a "sturgeon alert" by the Romanian Customs and five years of intensive training on CITES for Customs officers in Romania.

In Bulgaria a major seizure of sturgeon meat and caviar took place in March 2012.

- 16 kg of caviar and 30 kg of meat from Beluga Sturgeon (*Huso huso*) were confiscated when authorities stopped a car in March 2012 close to Montana (a city and province in northwestern Bulgaria, approx. 50 km south of the Danube). The fish was said to be caught in the Danube near Nikopol (Pleven province) and Svishtov (Veliko Turnovo province) and was apparently to be sold in Vidin[29].

[29] http://www.konkurent.bg/novini/16415/spipaha-16-kila-hayver-ot-moruna; http://www.montana.mvr.bg/PressOffice/News/news_20120312.htm

2. METHODOLOGY

2.1 DEVELOPMENT OF MARKET SURVEY METHODOLOGY

The methodology for carrying out the market survey was developed with the support of experts from TRAFFIC, WWF, and officials from Bulgaria, Romania and other EU Member States. WWF staff in Bulgaria and Romania supported the project with information on local circumstances and provided contacts to relevant agencies and experts. Information from Customs authorities of other EU Member States was very helpful to define focal areas of research. CITES Management Authorities from Romania and Bulgaria provided background information on the caviar trade and completed questionnaires about labelling and trade regulations.

The focus of the market survey was on caviar from Romania and Bulgaria. Survey teams visited major cities, holiday resorts along the Black Sea coast, and areas along the Danube where sturgeons were traditionally fished, as this is where most caviar trade was expected. Selected shops, restaurants, markets, street vendors and sturgeon farms were visited. Additional information was to be gathered, where possible, regarding vendors, locations, products offered for sale, caviar sources and trade methods and routes. Where caviar was available, small samples were bought for DNA analysis in order to be able to verify the species origin of the caviar.

Due to the sensitive nature of the issue, a covert approach was considered appropriate. Site visits were made by surveyors with a realistic story to explain the interest in buying caviar, adapted to the location and situation.

Obtaining samples for DNA testing in such a context was only possible through purchases (only four samples were obtained directly from Bulgarian sturgeon farms and were donated to the study free of charge). However, to limit the negative impacts of such purchases, the project designers took due care to limit the number of purchases to a minimum and to ensure that only small quantities of caviar were bought by the surveyors.

2.2 SURVEY TEAMS

In both Romania and in Bulgaria, a team of two people were contracted as surveyors. Each team was made up of nationals of the target country. Each surveyor team had adequate background and experience with research activities though in different subject areas; therefore results for

the two target countries are not necessarily directly comparable.

Face to face briefings about the caviar trade and the status of sturgeons took place between the surveys teams with the WWF project manager and the TRAFFIC project partner before survey work commenced. They were also warned about risks, and risk reduction strategies were explained. Focal areas and sites were determined and different approach strategies devised, according to local circumstances.

2.3 SURVEY PERIOD

The fieldwork period was focused on times when the chances of finding caviar on the market were expected to be the highest. Work began in April 2011, in order to cover the main sturgeon migration. The autumn peak in migration was missing in 2011 due to extremely low water levels in the Danube. The survey period lasted until February 2012 to allow a sufficient number of controls and research work and in order to include the peak caviar selling times of the year (St Nicholas' Day on 6th December, Christmas and New Year).

Throughout the market survey period, sturgeon fishing (except with special permits for breeding purposes) and trade in wild caviar from the Danube and Black Sea were prohibited both in Romania and in Bulgaria.

2.4 DNA ANALYSIS

In most cases it is not possible to determine the species origin of caviar by visual inspection alone and molecular methods have been used for this purpose. DNA analysis of caviar or other sturgeon products has been used to identify to the species level, including hybrids, which are popular in aquaculture production[16, 30]. This methodology can establish if there are discrepancies between the species indicated on the label on the container and that of the caviar in the container. If undertaken on a larger scale, DNA testing of caviar on the market can also provide information on which sturgeon species are most traded and – in the case of illegally obtained wild caviar – which are most affected by poaching.

DNA analysis is not yet sufficient to identify different populations of the same species (e.g. Beluga caviar from the Danube/Black Sea versus from the Caspian Sea, especially as sturgeons with haplotypes from Caspian populations might be caught in the Danube as a consequence of restocking or escapes from aquaculture operations). DNA analysis is also not able to distinguish between caviar of wild and farmed origin, as

[30] Ludwig A. (2008): Identification of Acipenseriformes species in trade. J. Appl. Ichthyol. 24 (Suppl. 1), 2-19

there are no genetic differences between wild and hatchery-raised fish[30]. Potential methods to address this could be the determination of fatty acid composition, reflecting differences in feed sources between wild caught and intensively farmed sturgeons[31], or the analysis of isotopes, whose compositions differ with different food or in different waters. Isotope analysis was used in a case in Germany, where caviar labelled as originating from Bulgarian aquaculture was shown actually to derive from the Caspian Sea[17]. The development of isotope analysis could be a crucial step in combating the "laundering" of illegally obtained wild caviar through farms.

Survey teams collected 14 caviar samples from Bulgaria and 14 caviar samples from Romania. Two additional caviar samples with Bulgarian origin were purchased in Austria. After purchase, samples were preserved in 96% alcohol (stored in a refrigerator) or frozen. They were then analysed at the Danube Delta National Institute (DDNI), Tulcea, Romania (www.ddni.ro) and at the Leibniz-Institute for Zoo and Wildlife Research (IZW), Berlin, Germany (www.izw-berlin.de).

2.4.1 PCR-RFLP ANALYSIS

PCR-RFLP (polymerase chain reaction - restriction fragment length polymorphism) analysis was applied by the DDNI in Romania. The methodology (as outlined in Ludwig, 2008[30]) allows identification of different species of the order of Acipenseriformes, which includes all sturgeon and paddlefish. By targeting mitochondrial DNA (cytochrome b sequences), the maternal sturgeon species can be determined. Therefore, the technique does not detect hybrids (as no conclusions on the paternal species are possible). Additionally, this approach has limitations for the differentiation of very closely related species (e.g. *Acipenser gueldenstaedtii*, *A. persicus* and *A. naccarii*).

2.4.2 DNA SEQUENCING

To reconfirm the results from PCR-RFLP analysis and to test the samples with poor DNA, samples were also analysed by DNA sequencing at IZW in Germany. With this more sensitive methodology, the succession of nucleotides representing the genetic code is determined. By using polymorphism of the mitochondrial cytochrome b gene, which harbours a sufficient amount of species-specific variation for nearly all sturgeon species, the maternal species can be determined with a high level of certainty. If sufficient reference data sets for evaluation are available in public data bases, the degree of DNA sequence variation allows

[31] Gessner J., Würtz S., Kirschbaum F., Wirth M. (2008). Biochemical composition of caviar as a tool to discriminate between aquaculture and wild origin. J. Appl. Ichthyol. 24 (Suppl. 1), 52-56

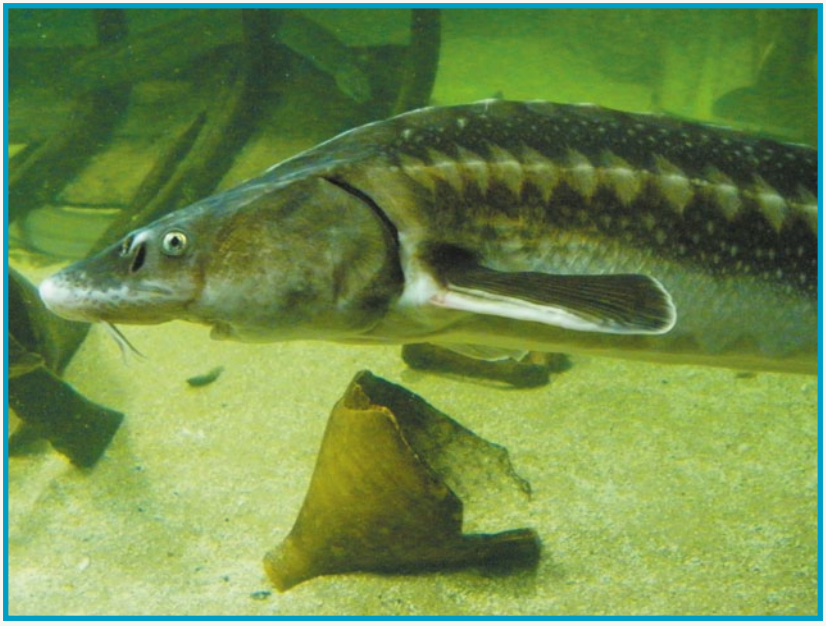
separation of sturgeon species and even of sub-species and populations[30].

However, for several reasons (close phylogenetic relationship, artificial hybridization, and hybridization with escaped fish from aquaculture or release programmes) some species of sturgeons can often not be distinguished by molecular methods:

- The very closely related species from the Russian Sturgeon complex (= Russian Sturgeon *Acipenser gueldenstaedtii*, Persian Sturgeon *A. persicus* and Adriatic Sturgeon *A. naccarii*)

- Russian Sturgeon (*Acipeneser gueldenstaedtii*) and Siberian Sturgeon (*A. baerii*), which often have some parts of their DNA the same as from the other species, due to historical hybridizations of these two species in Russian aquaculture operations and uncontrolled release of these animals, which are commonly used as founder populations in many sturgeon farms worldwide, and probably also in the Danube region.

No molecular approach has yet been developed to solve this issue sufficiently.



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3. RESULTS

30 samples were obtained as a result of around 100 visits (with some sites being revisited several times). In Romania, 38 sites were visited and 14 samples were purchased. In Bulgaria, visits at 41 sites resulted in 14 samples. An additional 2 samples of Bulgarian farm caviar were acquired in Austria to demonstrate the significance of the region as a supplier for European consumer markets.

Table 3 (see Executive Summary) summarizes all findings.

3.1 VENDOR TYPES

Visits were made at all potential locations where caviar might be sold.

Table 4: Vendor types in Bulgaria, Romania and Austria, with number of samples obtained

Type of Vendor	Romania	Bulgaria	Austria
Restaurants	5	2	0
Market stalls	3	0	0
Individual vendors (e.g. street hawkers, fishermen)	3	0	0
Sturgeon farms	0	4	0
Fish shops	0	3	2
“Russian” shops	0	2	0
Other shops	3	3	0
TOTALS	**14**	**14**	**2**

3.1.1 SHOPS

Many shops both in Romania and Bulgaria explained that they used to have caviar for sale but had stopped offering it due to low demand. Some shops only stock sturgeon caviar for the main selling time around Christmas and New Year. In several cases, caviar could only be bought on order a few days in advance.

3.1.2 RESTAURANTS

In some restaurants, caviar was listed on the menu, but in others it could be obtained on special request. Surveyors found that caviar from wild sturgeon is used as a sales argument to attract customers. In some restaurants in Romania, waiters advertised their caviar as a special delicacy from wild sturgeons from the region. However, in several cases a request for caviar was denied after lengthy check-ups of the potential customers (including their car and license plate) and discussions among staff, even if the initial request was received positively or caviar was listed openly on the menu.

3.1.3 INDIVIDUAL VENDORS (E.G. STREET HAWKERS AND FISHERMEN)

Figures 2 and **3:** Fishermen at Giurgeni bridge, Romania, showing that they offer big fish – which often means sturgeons – for sale

Street vendors at Giurgeni bridge in Romania.

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© WWF

Street vendors and fishermen are a very interesting group of suppliers but they can be difficult to approach because they are cautious about selling to unknown customers. Individual vendors in both countries offered to sell wild sturgeon caviar to survey teams.

In Romania, three samples were purchased from these types of vendor, all said to be from wild sturgeons. No caviar was sold by fishermen on the Danube upstream between Giurgiu and Calarasi, although waiters in a caviar-serving restaurant in Bucharest claimed that one of their sources for cheap caviar was from the Giurgiu-Ruse border area in Bulgaria.

In Bulgaria, no samples of caviar were collected from individual vendors, though some fishermen – illegally – offered wild caught Sterlets for sale. A fisherman from Vidin repeatedly promised to sell caviar from wild caught sturgeons from the following autumn migration, but in autumn 2011 the sturgeon migration failed due to extremely low water levels in the Danube so no sale was possible.

3.1.4 STURGEON FARMS

Nine samples of farmed caviar from Bulgaria were acquired within the survey (four directly from the sturgeons farms, one from a shop in Bulgaria, two from a shop in Romania, two from a shop in Austria), and all of these had the required CITES-labels and codes. During the period of the market survey, Romanian sturgeon farms did not sell caviar from their own stock as the fish had not yet reached reproductive maturity.

3.1.5 MARKETS

According to local information, certain markets had a reputation for selling illegal caviar. Three samples were obtained from markets, but in many cases enquiries for caviar were treated with suspicion and ultimately declined.

3.1.6 INTERNET

A number of companies or private individuals in Bulgaria and Romania offer caviar for sale on the internet. Online research found that most of the company sites provide pictures which show that the caviar has CITES labels. Most company sites actually offered to sell farmed caviar sourced from other countries, with only one product apparently from domestic aquaculture. At one company site, the information on species and country of origin was inconsistent ("Natural caviar from Russian Sturgeon" *Acipenser gueldenstaedtii* from a German producer was announced, but a photo of the CITES label showed a hybrid of *Huso dauricus* x *Acipenser schrenckii* as the species and China as the country of origin).

The online offers from private individuals did not provide any information regarding CITES labelling, and the source of caviar is unknown. Survey teams attempted to contact many of these vendors but the response rate was low, and those who did speak to the survey team members were very suspicious, asked lots of questions, and ultimately refused to sell caviar. Consequently, no samples obtained via the internet could be included in this research. Interestingly, one of the telephone numbers advertised on the internet correlated with a telephone number obtained by the field survey teams from an individual vendor. This led to the purchase of caviar from presumably wild-caught sturgeons.

3.2 THE MARKETING OF NON-STURGEON CAVIAR

The market survey came across other types of caviar that do not originate from sturgeon. In Bulgaria, for example, a paste made from the eggs of herring or carp is known as "tamara haiver" (cream caviar). These types of fish eggs are not subject to the same rules and regulations as caviar from sturgeon. Some non-sturgeon caviar did appear to be "mis-marketed" as sturgeon caviar. For example, containers often had a sturgeon illustration and were entitled "black caviar" and displayed the actual ingredients in tiny letters.

3.3 IMPLEMENTATION OF CAVIAR LABELLING IN BULGARIA AND ROMANIA

Some details of the caviar labelling requirements laid down by Commission Regulation (EC) No 865/2006, as amended, (e.g. production of the labels, position of the label on the tin, etc.) need to be regulated by national laws. Accordingly, a questionnaire was sent to the CITES Management Authorities of Bulgaria and Romania to get details about the specific requirements in May 2011.

3.3.1 CAVIAR LABELLING REGULATIONS IN BULGARIA

The Bulgarian CITES Management Authority reported that in Bulgaria, *Regulation no. 3 from 31 October 2008 on marking and labelling of specimens of species under Regulation 338/97 on the protection of species of wild fauna and flora by regulating trade therein* provides the legal and administrative measures at the national level on labelling of caviar processed, packaged or repackaged and on ensuring that caviar on the domestic market is appropriately labelled. According to this regulation, the labels have to be glued to each caviar tin in a way that ensures that it covers the tin and does not allow the removal and transfer to another tin without destroying its integrity. This regulation also

prescribes the information (or codes) to be used on the label.

Specimens of licensed Bulgarian CITES caviar labels, as provided by the Bulgarian CITES Management Authority, are shown in Annex 5.4.

The production of the labels was reportedly not centralized in Bulgaria; the labels are instead issued by the trader after they have been authorized by the CITES Management Authority. In May 2011, four companies were registered by the CITES Management Authority. As two of these have the same registration code, a total of three label types were in use. The regulation does not prescribe any security features for the labels according to the Bulgarian CITES Management Authority.

The Bulgarian CITES Management Authority reported that in Bulgaria, national legislation contains provisions covering sanctions in case of non-compliance with the labelling requirements (*Regulation no. 8* is connected with article 102a paragraph 2 of the *Biodiversity Act*), in the form of fines.

The Bulgarian Management Authority reported not having encountered any evidence of forged labels.

3.3.2 CAVIAR LABELLING REGULATIONS IN ROMANIA

The Romanian CITES Management Authority reported that in Romania, Governmental Decision no. 1191/2010 regarding the register system of sturgeons stocks from aquaculture facilities and of the caviar produced from aquaculture operations, and marking by labelling of the caviar provides legal and administrative measures at the national level on the labelling of caviar processed, packaged or repackaged and on ensuring that caviar on the domestic market is appropriately labelled. This regulation requires that the label seals the caviar container.

For specimens of licensed Romanian CITES caviar labels, which were contributed by the Romanian CITES Management Authority, see Annex 5.5.

The production of the labels is not centralized in Romania according to the Romanian CITES Management Authority. In May 2011, two different labels were in use in Romania for two of the 14 exporting or processing companies that have been licensed by the CITES Management Authority. The regulation does not prescribe any security features for the labels.

Romania reported that their national legislation (*Governmental Ordinance no. 195/2005 on environmental protection as amended by Governmental Ordinance no. 164/2008*) contains provisions covering sanctions (more specifically, fines) in case of non-compliance with

the labelling requirements. For private (or natural) persons the fine is between approximately EUR 730 and approximately EUR 1460 and for businesses between approximately EUR 6070 and approximately EUR 12 140.

The Romanian Management Authority reported not having encountered any evidence of forged labels.

3.3.3 AMBIGUITIES CONCERNING LICENSED CAVIAR PRODUCING, PROCESSING AND (RE-) PACKAGING PLANTS

Caviar processing and (re-)packaging plants need to be licensed by the Management Authority of CITES Member States in order to be allowed to process, (re-)package or export caviar. According to the EU Wildlife Trade Regulations (Regulation (EC) No 865/2006, amended by Regulation (EC) No 100/2008, Art. 66, paragraph 7)[9] caviar-producing aquaculture operations must also be licensed by the Management Authority.

However, there is some evidence from Bulgaria that companies other than those officially listed in the CITES register as exporting or processing facilities are involved in caviar production or processing. There is also some ambiguity about whether companies not licensed for export are indeed exporting.

Apart from the six licensed companies listed by CITES[24], companies like Reya Fish, Aquafish or Akvamash are also involved in caviar production or processing. Akvamash claims to breed four species of sturgeons and to have a sturgeon caviar capacity of 1.5 tonnes, already selling caviar to the US and to other EU countries[32]. Nevertheless, none of these companies are registered by CITES as exporting or processing facilities.

Another unclear issue is that – according to the CITES website – only three companies in Bulgaria are listed as licensed caviar exporters (Agamemnon I Ltd., Aqua Beluga Ltd and ET FANI-Miroslav Shopov)[24]. The other three companies are only registered as processing and/or repackaging plants. This leads to the assumption that either these other Bulgarian companies (Beluga Inc. Vidin, Oscietre Commerce Ltd. and Parpen Tchobanov Ltd.) do not export caviar or that the information in the CITES register is not fully up-to-date.

[32] Akvamash produces caviar for the US and the EU. Eurofish Magazine 6/2010, 33-34

3.4 RESULTS FROM DNA TESTING

The results of the DNA testing are contained in Table 5 below. For three samples from Romania, no results could be achieved, since the caviar and its DNA were too degraded (RO 4, 21 and 24). In the end, a total of 27 samples (= 90 % of all samples) could be analysed.

Table 5: Summary of results on sturgeon species identification from samples acquired from the Romanian and Bulgarian markets.

Sample code	Location of acquisition	CITES label species code	Species (of female line) identified	Comments
SAMPLES FROM ROMANIA				
RO 1	Restaurant, Tulcea	no CITES label visible	HUS	described by vendor as from wild Beluga Sturgeons from Sulina
RO 2	Anonymous, Port of Sulina	no CITES label	HUS	allegedly the caviar supplier of RO 1; described by vendor as from wild sturgeons
RO 3	Anonymous, Harsova, Constanta county	no CITES label	HUS	contact from RO 4; described by vendor as from wild sturgeons
RO 4	Fisherman, Vadu Oii – Giurgeni Bridge	no CITES label	no results	described by vendor as from wild sturgeons
RO 5	Restaurant, Bucharest	no CITES label visible	HUS + at least one other sturgeon species	
RO 6	Restaurant, Bucharest	no CITES label visible	HUS + at least one other sturgeon species	described by vendor as from wild sturgeons
RO 7	Private party at restaurant, Bucharest	no CITES label visible	GUE/BAE + at least one other sturgeon species	
RO 8	Shop, Bucharest	CITES label visible but species code not legible	GUE/BAE + at least one other sturgeon species	farmed caviar from Hungary
RO 9	Market stall, Piata Obor, Bucharest	no CITES label	not caviar	not sturgeon caviar, but sequences of sturgeon DNA – potentially made from sturgeon meat and other material
RO 10	Market stall, Piata Obor, Bucharest	no CITES label	not caviar	not sturgeon caviar, but sequences of sturgeon DNA – potentially made from sturgeon meat and other material
RO 11	Restaurant, Bucharest	no CITES label visible	no results	
RO 12	Market stall, Piata Obor, Bucharest	no CITES label	not caviar	not sturgeon caviar
RO 13	Shop, Bucharest	GUE	GUE/BAE*	in agreement with CITES label; farmed caviar from Bulgaria
RO 14	Shop, Bucharest	GUE	no results	farmed caviar from Bulgaria

Sample code	Location of acquisition	CITES label species code	Species (of female line) identified	Comments
SAMPLES FROM BULGARIA				
BG 1	Fish shop, Sofia	no CITES label	not caviar	no DNA traceable; synthetic product
BG 2	Shop, Sofia	hybrid of BAExNAC	NAC	in agreement with CITES label; farmed caviar from Italy
BG 3	Fish shop, Sofia	no CITES label	no caviar	no DNA traceable; synthetic product
BG 4	Sturgeon farm & caviar trader	GUE	GUE	in agreement with CITES label; farmed caviar from Bulgaria
BG 5	Fish restaurant, Varna	no CITES label visible	GUE/PER/NAC	DNA from at least two different animals
BG 6	Fish restaurant, Varna	no CITES label visible	Lumpfish (Cyclopterus lumpus)	
BG 7	Fish shop, Sofia	hybrid of NACxBAE	GUE/BAE*	in agreement with CITES label; farmed caviar from Bulgaria
BG 8	Russian Shop, Varna	BAE	GUE/BAE*	in agreement with CITES label; farmed caviar from Germany
BG 9	Sturgeon farm & caviar trader	GUE	GUE/PER/NAC*	in agreement with CITES label; farmed caviar from Bulgaria
BG 10	Shop, Plovdiv	BAE	GUE/BAE*	in agreement with CITES label; farmed caviar from Uruguay
BG 11	Shop, Plovdiv	SCH	DAU	different from CITES label; microsatellites indicate hybrid status, probably SCHxDAU; farmed caviar from China
BG 12	Sturgeon farm & caviar trader	GUE	GUE/BAE*	in agreement with CITES label; farmed caviar from Bulgaria
BG 13	Sturgeon farm & caviar trader	GUE	GUE/BAE*	in agreement with CITES label; farmed caviar from Bulgaria
BG 14	Russian shop, Plovdiv	GUE	GUE/PER/NAC*	in agreement with CITES label; farmed caviar from Germany
SAMPLES OF BULGARIAN ORIGIN (BOUGHT IN AUSTRIA)				
AT 1	Fish shop, Vienna	STE	GUE/BAE	different from CITES label; farmed caviar from Bulgaria
AT 2	Fish shop, Vienna	HUS	GUE/BAE (but no secure species determination possible)	probably different from CITES label; farmed caviar from Bulgaria

* These species of sturgeons can often not be distinguished by molecular methods, but the caviar was determined to be out of this group of species.

HUS: Beluga Sturgeon (*Huso huso*)
BAE: Siberian Sturgeon (*Acipenser baerii*)
GUE: Russian Sturgeon (*A. gueldenstaedtii*)
PER: Persian Sturgeon (*A. persicus*)
NAC: Adriatic Sturgeon (*A. naccarii*)
DAU: Kaluga Sturgeon (*H. dauricus*)
SCH: Amur Sturgeon (*A. schrenckii*)
STE: Stellate Sturgeon (*A. stellatus*)

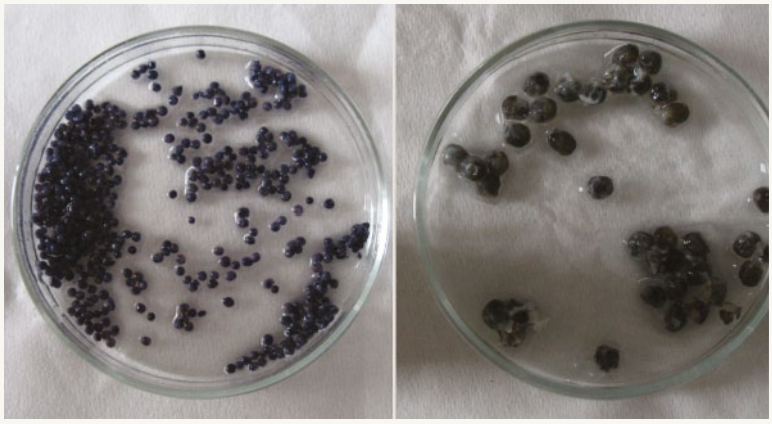
3.4.1 SAMPLES SOLD AS CAVIAR BUT SHOWN NOT TO BE CAVIAR FROM STURGEON

As can be seen from the table above, six of the samples proved to be fake i.e. were not caviar from sturgeons:

- One sample from a Bulgarian fish restaurant (sample code BG 6) was from Lumpfish (*Cyclopterus lumpus*).
- Two Bulgarian samples from fish shops in Sofia (sample codes BG 1 and 3) were not fish eggs. It is unclear exactly how this product is produced and what it is but there were no traces of sturgeon DNA and the product was shown to not be eggs from fish of any kind
- Three Romanian samples (sample codes RO 9, 10 and 22) from a fish shop at a market in Bucharest were not fish eggs either, but DNA of sturgeons could be determined, suggesting that it was made artificially from sturgeon tissue and other material.

Prior to DNA extraction, the unusual size and/or colour of these caviar samples were noted. The size of e.g. sample RO 9 was much smaller than the typical sturgeon caviar (see **Figure 4**), indicating that this material did not originate from sturgeon. In ethanol, the supernatant of these samples was reddish-brown (RO 9 and 10) or greenish (BG 1 and 3), which means that the material had been coloured to give it the typical blackish colour of sturgeon caviar and the dyes washed out in ethanol.

Figure 4: Sample code RO 9 (A) compared to typical Beluga caviar (B).



© DDNI Romania

A. B.

3.4.2 CAVIAR FROM STURGEONS

For 21 out of the 30 purchased samples sturgeon could be determined as species of origin.

Five of all samples were declared by vendors to be from wild sturgeon (RO 1, 2, 3, 4, 6) and were subsequently shown by DNA testing (except for sample RO 4, where DNA analysis was not possible, but there was no indication that it was not from sturgeon.) to be totally or partly from Beluga Sturgeon (*Huso huso*), making this claim credible.

3.4.2.1 CAVIAR FROM STURGEONS: SAMPLES FROM ROMANIA

Of the samples purchased in Romania, five samples were totally or partly from Beluga Sturgeon (*Huso huso*):

- Three of these samples were bought in restaurants – RO 1 in Tulcea (purely *Huso huso*), RO 5 and 6 in Bucharest (*Huso huso* with at least one other sturgeon species present).
- Two samples were obtained from street vendors – RO 2 in the port of Sulina and RO 3 in Harsova (both purely *Huso huso*).

CITES labels were not shown in these cases. In four of these cases, information from waiters or vendors indicated that the origin of these samples was from wild individuals. If true, they must have been obtained by illegal catches as sturgeon fishing is banned in Romania.

Three samples from Romania were shown to be from Siberian Sturgeon (*Acipenser baerii*)/Russian Sturgeon (*A. gueldenstaedtii*):

- One of these samples (RO 7) was collected at a private party in a restaurant in Bucharest. In this case DNA analysis determined *Acipenser baerii/A. gueldenstaedtii*, but there was at least one other sturgeon species present also.
- The other two samples (RO 8 and 23) were purchased from shops in Bucharest. Both were labelled according to CITES regulations. In the case of RO 8, more than two sturgeon species were found, with one of them being *Acipenser baerii/A. gueldenstaedtii*.

3.4.2.2 CAVIAR FROM STURGEON: SAMPLES FROM BULGARIA

- Of the caviar samples obtained in Bulgaria, six samples were from the closely related group of Russian Sturgeon (*A. gueldenstaedtii*)/ Adriatic Sturgeon (*A. naccarii*)/Persian Sturgeon (*A. persicus*):
- Three were obtained at Bulgarian sturgeon farms (BG 4, BG

9 and BG 13) and all had CITES labels with species code of *A. gueldenstaedtii*. BG 4 proved to be from *A. gueldenstaedtii*, BG 9 from one of the species group; however, in sample BG 13, DNA from different individuals were found, which is unusual for *A. gueldenstaedtii* where individuals are genetically too similar to be distinguished and this indicates the sample is a mixture originating from several species, including *A. gueldenstaedtii*.

- BG 14 – purchased in a Russian shop in Plovdiv – *A. gueldenstaedtii* (from Germany) was established as the species of origin, as correctly shown on the CITES label.

- BG 2 – from a shop in Sofia – was determined as *A. naccarii*, with a CITES label showing a hybrid of a Siberian Sturgeon (*Acipenser baerii*) male and an Adriatic Sturgeon (*A. naccarii*) female from Italy as animal of origin.

- BG 5 was bought in a fish restaurant in Varna; no CITES label was visible in this case.

Four samples were found to derive from Siberian Sturgeon (*Acipenser baerii*)/Russian Sturgeon (*A. gueldenstaedtii*), all were correctly labelled and species codes were in agreement with DNA results:

- BG 7 was bought in a fish shop in Sofia, the species code of the CITES label showed a hybrid of an Adriatic Sturgeon (*A. naccarii*) male and a Siberian Sturgeon (*Acipenser baerii*) female from Bulgaria as animal of origin.

- BG 8 was from a Russian shop in Varna, with a CITES label and species code of Siberian Sturgeon (*Acipenser baerii*) from Germany.

- BG 10 was acquired at a shop in Plovdiv, also with a CITES label and species code of Siberian Sturgeon (*Acipenser baerii*), but from Uruguay.

- BG 12 was provided by an aquaculture operation; according to the species code of the CITES label it derived from *A. gueldenstaedtii*.

One sample (BG11) of farmed caviar from China was labelled as *Acipenser schrenckii* (Amur Sturgeon), but was actually found via DNA analysis to be *Huso dauricus* (Kaluga Sturgeon) as species of origin, at least of the female line. Therefore this is likely to be a hybrid of *Huso dauricus* and probably *Acipenser schrenckii*, which has become a quite common hybrid in aquaculture in China in recent years (Arne Ludwig, pers. comm., September 2012).

3.4.2.3 CAVIAR FROM STURGEON: SAMPLES FROM AUSTRIA

Two samples of Bulgarian farm caviar were bought in Vienna:

- AT 1 had a CITES label with the species code of Stellate Sturgeon (*Acipenser stellatus*), but DNA analysis indicated that the caviar was in fact from Siberian Sturgeon (*Acipenser baerii*)/Russian Sturgeon (*A. gueldenstaedtii*).

- AT 2 was labelled as from Beluga Sturgeon (*Huso huso*), but DNA results pointed also to Siberian Sturgeon (*Acipenser baerii*)/Russian Sturgeon (*A. gueldenstaedtii*) as the species of origin. However, results were too poor to allow a secure species identification.

These cases probably do not indicate a problem from a species conservation point of view, as Siberian Sturgeon is not native to the Danube but a species quite commonly reared in aquaculture facilities. Nevertheless, they do illustrate problems with the reliability of the caviar labeling system.

3.4.3 SAMPLES WITHOUT A CITES LABEL

In 15 cases – half of the samples – the origin of the purchased caviar could not be determined as no CITES labels were shown:

- Seven unlabelled samples were obtained in restaurants (two in Bulgaria, five in Romania), where it is not obligatory to show the CITES labels to customers. However, two of the Romanian restaurants (in Tulcea and in Bucharest) emphasized that they offer wild caviar from Sulina. In one Bulgarian restaurant, the caviar was not from sturgeon but from Lumpfish (*Cyclopterus lumpus*).

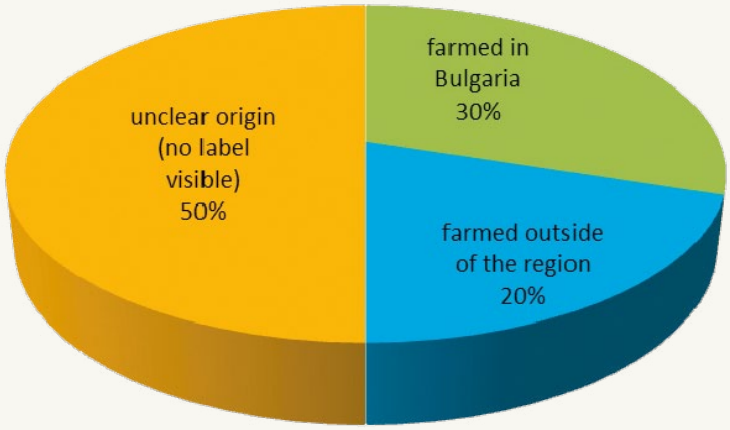
- Five unlabelled samples were acquired in fish shops (two in Bulgaria, three in Romania). All of those were shown by DNA analysis not to be caviar from sturgeon.

- Three unlabelled samples (all in Romania) were obtained from fishermen or vendors selling caviar in the street, allegedly from wild-caught sturgeons. One of these was found in the port of Sulina at the Black Sea via information from staff in a caviar-serving restaurant in Tulcea. Two samples were obtained further up the Danube, at Giurgeni Bridge and in the nearby town of Harsova.

3.4.4 CAVIAR IMPORTED FROM OUTSIDE OF THE LOWER DANUBE REGION

Six samples of caviar that were purchased had been imported from countries outside of the lower Danube region; namely from Germany (BG 8, BG 14), Italy (BG 2), Hungary (RO 8), China (BG 11) and Uruguay (BG 10). All had CITES labels, displaying them as captive bred. There was more of this caviar available on the market, but as this was not directly within the remit of this study, only a limited selection of this category was bought.

Figure 5: Origin of puchased samples



Unclear origin: 15 samples (6 of them not sturgeon caviar)
Farmed in Bulgaria: 9 samples
Farmed outside of the region: 6 samples

3.4.5 CAVIAR PRODUCED FROM MIXES OF DIFFERENT STURGEON SPECIES

For five samples, DNA analysis found that the caviar was not from a single species, but from several (RO 5, 6, 7, 8 and BG 13). This indicates mislabelling, as according to current regulations[2] only “pressed caviar” (=dense briny paste made from damaged sturgeon eggs) can be a combination of roes from different sturgeon species and must be labelled as MIX. No labels in the study were labelled with this code and none of the samples was “pressed caviar”.

Also experience from DNA analysis at the Leibniz-Institute for Zoo and Wildlife Research, Berlin, shows that mixing of caviar from different species can be found occasionally (Arne Ludwig, pers. comm., September 2012).

3.5 QUALITATIVE INFORMATION OF ILLEGAL FISHING AND TRADE NETWORKS IN ROMANIA AND BULGARIA

Relevant anecdotal information was gathered during the survey regarding evidence of illegal fishing and trade during informal conversations with official and unofficial traders, enforcement officials, fishermen as well as other local people. This information is based on unconfirmed reports gathered by survey teams.

Illegal caviar transfer is said to take place from Romania to Bulgaria as well as the other way round, with many reports pointing to the town of Ruse as an important crossing for caviar smuggling. Caviar from the Ukraine is said to come to Bulgaria on ships or ferries over the Black Sea. According to information from Bulgarian fishermen at the port of Varna, Ukrainian sailors, who regularly cross the Black Sea, bring small amounts of caviar from Ukraine and sell it to restaurants in the area. Caviar is also said to be transferred from Kazakhstan via Ukraine and Moldova. Also cruise liners along the Danube and the Black Sea, which often offer caviar on their menus, could potentially be involved in illegal trade networks, as well as other vessels travelling up and down the Danube.

Restaurants appear to be connected to individual vendors through personal networks. In one case in Romania, the trade chain could be followed from a restaurant selling caviar to a supplier at the port of Sulina. Although the chief waiter in the restaurant claimed that wild Beluga caviar from the area of Sulina was offered, he would not give any contacts, but another middleman could be found. DNA analysis showed that both the sample from the restaurant as well as the one bought at the same day in Sulina were from Beluga Sturgeon (*Huso huso*), potentially even deriving from the same specimen.

3.5.1 BULGARIA

Fishermen from the area of Kozloduj on the Danube stated that they use state-of-the-art equipment to localize large sturgeons in the river. The fish are tracked with sonar and then caught with electric devices. Coordinates of sturgeons are saved with GPS, as well as those of nets and illegal hook lines ("carmaci"), so no buoys or empty bottles on the river surface mark their locations and can reveal their presence to fishing inspections.

Bulgarian National Agency of Fisheries and Aquaculture (NAFA) reported that hundreds of metres of "carmaci", traditionally used for fishing sturgeon and banned since 2008[33], were confiscated along the Danube in 2010 and 2011. Bulgarian NAFA registered just one case of sturgeon fishing in the Danube without the necessary licence in 2008-2010 and

[33] Law of Fisheries and Aquaculture, Article 35, Paragraph 6 (State Gazette No. 94/11.2005)

the poacher was fined. Only a few sturgeons accidently caught as bycatch in nets were reported – two Beluga Sturgeons in Vidin province in 2009 and 2011, one Beluga Sturgeon (a 70-80 kg male) in Kozloduj in 2010. However, it is clear that unreported fishing of sturgeons is occurring as demonstrated by recent seizures of illegal meat and caviar.

According to fishermen on the Bulgarian side of the Danube, sturgeon catches have declined sharply, which has reduced the supply of illegal caviar on the market. Nevertheless, and despite the risk of penalties, fishermen around Kozloduj indicated that they still catch wild sturgeons, even if the caviar yield is limited.

Caviar from poached sturgeons is sold to traders or directly to restaurants in Sofia or in resorts on the Black Sea coast. Some Bulgarian fishermen explained that caviar is sold to Romania, as higher prices can be achieved there.

Bulgarian fishermen around Kozloduj related that Beluga (*Huso huso*) is the most commonly caught species of sturgeon, especially in the western part of the Danube in the provinces of Vidin or Pleven. This correlates with DNA results arising from this survey. In this area, at least 25-30 Beluga Sturgeons are said to be fished every year, usually in their resting sites. Locals report that those who are involved in poaching and trade of Beluga Sturgeons are relatively well-off compared to others in the region.

Although protected by the catch moratorium, market survey teams found that Sterlet (*Acipenser ruthenus*) is still fished in both Bulgaria and Romania, as it can be caught with nets and does not need the use of the banned “carmaci”. Fishermen at the western part of the Bulgarian Danube offered wild caught Sterlets for sale in spring 2011 and even volunteered to send them to Sofia by bus.

Sturgeon breeders in Bulgaria told the surveyors that 8-10 years ago, they were regularly offered illegal caviar from wild Danube sturgeons caught in Bulgaria, Romania or Ukraine, as well as live wild sturgeons for breeding. Nowadays, these attempts have purportedly become very rare – although they still occur.

Mislabelling is also apparently used by illegal traders. One Bulgarian caviar producer claims that he found his labels on caviar tins for sale that were not produced by his company.

Authorities controlling restaurants in Bulgaria unofficially report that they are repeatedly finding jam or gherkin glasses of sturgeon caviar without CITES labels in the fridges of some establishments. Restaurants usually claim these to be a gift for private consumption and prosecutions have not ensued from these cases.

All this information points to a substantial and active illegal fishing and trade in caviar in Bulgaria.

3.5.2 ROMANIA

There are reports that wild sturgeons are poached from the Borcea branch of the Danube, and that the caviar is then sold in Giurgiu to a German trader who transfers it to Bulgaria – through Ruse – from where it is sold by an organized system as Bulgarian farm caviar – "legalized" and mis-declared with source code "C" (displaying it as captive bred). Additionally, sturgeon breeders interviewed by survey teams report being offered illegal caviar.

In a restaurant in Bucharest which offers caviar, the Romanian surveyors were told that cheap caviar – supposedly from poached sturgeons – can be sourced from Harsova/Giurgeni as well as from Giurgiu/Ruse on the Bulgarian side.

Sterlets up to 40 cm in length were sold at Piata Obor Market in Bucharest in spring 2011, priced at RON 35 (approx. EUR 8.50) per kilo. The vendor promoted them as "purely Romanian" and "taken from the wild". The same man also sold caviar which he assured the surveyors to be from sturgeons but was in fact shown by DNA testing to be fake. In autumn 2011, Sterlets were also found for sale in the street along the Danube between Giurgiu and Calarasi. The fish were rather small (around 1 kg).

Again, this information points to a substantial and active illegal trade in sturgeons and caviar in Romania.

3.6 PRICES FOR CAVIAR

Prices of caviar vary a lot. A very low price could be an indicator that the caviar is in fact fake, but market surveys showed that this is not necessarily the case.

In Romania, the lowest prices were approximately 0.30 EUR/gram for caviar (subsequently shown via DNA analysis not to be caviar) bought at a fish shop. However, just slightly more – approximately 0.40 EUR/gram – was paid for Beluga (*Huso huso*) caviar in a restaurant (RO 1). According to the waiter, this was from wild Danube sturgeons and the species (*Huso huso*) was confirmed by DNA analysis. Prices went up to 4 EUR/gram for the farmed caviar from Hungary purchased in a shop (RO 8).

Table 6: Prices of purchased real and fake caviar from Romania

SAMPLES FROM ROMANIA				
Type of caviar	**Price (in RON)**	**Amount (in grams)**	**Price per gram in EUR**	**Comments**
RO 9, 10, 22; unlabelled; from fish shop in Bucharest	55.00	50	0.30	not caviar
RO 1; no label visible; from restaurant in Tulcea	150.00	100	0.40	allegedly wild Beluga caviar, confirmed by DNA analysis to be from Beluga Sturgeon
RO 5; no label visible; from restaurant in Bucharest	350.00	50	1.60	
RO 6; no label visible; from restaurant in Bucharest	400.00	50	1.80	allegedly wild caviar, found by DNA analysis to be from Beluga Sturgeon and at least one other sturgeon species
RO 23, 24; labelled (GUE/BG); from shop in Bucharest	533.00	50	2.40	
RO 8; labelled (?/HU); from shop in Bucharest	150.00	10	4.00	

In Bulgaria, the three cheapest samples (BG 3, 1 and 6), all from shops, proved to be not from sturgeons. Real sturgeon caviar with CITES labels, bought in shops, cost between 0.86 EUR/gram for farmed Italian caviar (BG 2) and 2.67 EUR/gram for farmed German caviar (BG 10).

Table 7: Prices of purchased real and fake caviar from Bulgaria

SAMPLES FROM BULGARIA				
Type of caviar	**Price (in RON)**	**Amount (in grams)**	**Price per gram in EUR**	**Comments**
BG 3; unlabelled; from fish shop in Sofia	22.00	113	0.10	not caviar
BG 1; unlabelled; from fish shop in Sofia	22.50	113	0.11	not caviar
BG 6; no label visible; from fish restaurant in Varna	16.20	30	0.27	not sturgeon caviar
BG 2; labelled (BAExNAC/IT); from shop in Sofia	84.00	50	0.86	
BG 7; labelled (NACxBAE/BG); from fish shop in Sofia	105.00	50	1.08	
BG 8; labelled (BAE/DE); from Russian shop in Varna	125.00	50	1.28	
BG 11; labelled (GUE/DE); from shop in Plovidv	119.99	30	2.07	
BG 14; labelled (GUE/DE); from Russian shop in Plovdiv	210.00	50	2.16	
BG 10; labelled (BAE/UY); from shop in Plovidv	155.99	50	2.67	

In Austria, farmed Bulgarian caviar sold as Beluga cost 4.20 EUR/gram; farmed Bulgarian caviar sold as Sevruga (from Stellate Sturgeon, *Acipenser stellatus*) was bought for 3.14 EUR/gram.

Table 8: Prices of purchased caviar from Bulgaria

SAMPLES OF BULGARIAN ORIGIN (BOUGHT IN AUSTRIA)				
Type of caviar	**Price (in RON)**	**Amount (in grams)**	**Price per gram in EUR**	**Comments**
AT 2; labelled (HUS/BG); from fish shop in Vienna	89.00	28.35	3.14	
AT 1; labelled (STE/BG); from fish shop in Vienna	119.00	28.35	3.14	

When there are quotas for caviar from wild sturgeons and trade is legal, it is expected to be more expensive than caviar from farmed sturgeons. During the survey period, there was no quota for wild-taken caviar, and any trade with caviar from wild sturgeons was illegal. As results for Romania show, allegedly wild – and therefore illegal – caviar can have similar prices as legal, farmed caviar.

Obviously it is hard to verify prices from the "black market" but some information regarding prices for illegally traded sturgeon caviar was received.

According to one individual, black market caviar prices in Tulcea, Romania, were as follows in February 2011:

- 1 kg Beluga caviar (from St George in the Danube delta): RON 2400-3000 (0.57-0.70 EUR/gram)
- 1 kg Sevruga caviar (Stellate Sturgeon): RON 1400-1600 (0.33-0.38 EUR/gram)
- 1 kg Beluga caviar (smuggled from Ukraine): up to RON 1800 (0.42 EUR/gram)

Another individual, an aquaculture manager, reported that illegal caviar prices considerably undercut those of farmed caviar. This person reported that poachers in Romania sell Sevruga caviar (from Stellate Sturgeon, *Acipenser stellatus*), for EUR 200 per kilogram, whereas aquaculture operations need to sell their caviar for at least EUR 500 per kilo due to the high investment for sturgeon farming.

On the Bulgarian stretch of the Danube, fishermen around Kozloduj told the surveyors that caviar from poached sturgeons was sold for approx. 400 EUR/kg in Bulgaria, while it would achieve 1300 EUR/kg in Romania.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

4.1.1 THERE IS EVIDENCE OF ILLEGAL FISHING OF WILD STURGEON IN ROMANIA AND BULGARIA

This survey found that the poaching of sturgeons still appears to be a problem both in Bulgaria and Romania, despite legal protection in the form of sturgeon fishing bans in both countries. In five cases, the caviar was declared by vendors to be wild caught, with DNA evidence showing that at least four of these samples were from the highly sought-after and costly Beluga Sturgeon (*Huso huso*).

In addition, there is plenty of qualitative evidence indicating that illegal fishing still occurs on the Danube. Bulgarian fishermen indicate that they are still catching sturgeons in the Danube, and wild caught Sterlet (*Acipenser ruthenus*) is caught and sold in both countries.

These illegal catches present a significant threat to the last remaining sturgeon stocks in the Danube, and the catch moratoria in Romania and Bulgaria will not be successful if the regulations cannot be enforced more effectively.

4.1.2 CAVIAR FROM WILD STURGEONS IS STILL OFFERED FOR SALE

Although domestic trade in caviar from wild-caught Danube sturgeons is forbidden in both countries, caviar claimed to come from wild-caught sturgeon could be bought by surveyors on several occasions in Romania and was offered for sale in Bulgaria. Caviar said to be from wild sturgeons and offered without CITES labels – and thus illicit – was obtained from street vendors in Sulina (RO 2), Harsova (RO 3) and at Giurgeni bridge (RO 4). In two restaurants in Tulcea (RO 1) and in Bucharest (RO 6), waiters claimed explicitly that their caviar was from wild Danube sturgeons.

Naturally, true volume of illegal caviar trade could be considerably higher than documented by the cases in this project.

In all cases where caviar was suspected to be from wild-caught sturgeons (except for RO 4, where DNA analysis failed), the species of origin was Beluga Sturgeon (*Huso huso*), the most sought after species of Danube sturgeon.

Though traders of illegal caviar are aware that their activities are against the law and take preventive measures (close surveillance and detailed enquiries of customers), the provenance of caviar from wild sturgeons – and from national territory – seems to be still a valuable sales argument.

4.1.3 SAMPLES WITHOUT CITES LABELS PRESENTED AS CAVIAR FROM STURGEON ARE OFTEN FAKE

The market survey found that six samples were not in fact sturgeon caviar, despite being explicitly sold as such. These samples were typically from market stalls or shops and did not have a visible CITES label but were presented to customers as caviar from sturgeon. DNA analysis found these to be artificial eggs made from sturgeon meat or other tissue (RO 9, RO 10), eggs from other species of fish e.g. Lumpfish (BG 6) or not eggs from fish of any kind but made artificially by unknown means (BG 1, BG 3).

In addition to this, in a number of cases "caviar" was offered for sale in Bulgaria and Romania (as well as e.g. in Austria), with the drawing of a sturgeon on the lid and the words "black caviar" (usually in Russian) implying it is from sturgeons, though the ingredients usually declare the product are eggs from other fish. The misleading of consumers in this manner is primarily a consumer issue rather than a conservation issue. However, it does have implications for conservation where sturgeon meat is involved and therefore is an issue which should be considered by CITES and the enforcement authorities.

4.1.4 THE INCORRECT LABELLING OF CAVIAR IS WIDESPREAD

The market survey found several cases of mislabeling:

- Eight samples did not have mandatory CITES labels and codes (not including any samples from restaurants, where the container with the label is not expected to be on display); DNA analysis showed that five of these were not from sturgeon
- Three samples with CITES labels were from sturgeon, but DNA analyses suggested they were from species or hybrids other than those declared on the label
- Five samples were mixes from more than one species of sturgeon though this was not declared on the label

While caviar in trade without CITES labels is certainly illegal, caviar with CITES labels is probably often seen as per se legal and is therefore often not further investigated by enforcement officials.

A key concern about incorrect labelling from a conservation point of view is that caviar from wild-caught sturgeon could be "laundered" to appear legal by labelling it as farmed caviar. DNA testing used in this survey could not confirm whether specific species were farmed or wild caught so this survey cannot confirm or disprove this thesis. However, mislabelling of this type is clearly a risk to wild sturgeon. Advances in technology may help to distinguish between wild-caught and farmed individuals.

The mixing of caviar from different sturgeon species is also an emerging issue, as confirmed by this research.

4.1.5 PRICES VARY CONSIDERABLY AND DO NOT CORRELATE CLEARLY TO SOURCE TYPE AND AUTHENTICITY OF CAVIAR

Prices of caviar vary considerably and do not necessarily indicate whether the caviar is real or fake, wild or farmed. Unlabelled samples that were explicitly sold as sturgeon caviar but were exceptionally cheap (0.10-0.27 EUR/gram in Bulgaria, 0.30 EUR/gram in Romania) were indeed not from sturgeon but from Lumpfish (*Cyclopterus lumpus*), presumably sturgeon meat and other material. Allegedly wild caviar in a Romanian restaurant, however, cost only slightly more than that (0.40 EUR/gram) and was actually from Beluga Sturgeon (*Huso huso*), one of the most expensive caviars.

4.2 RECOMMENDATIONS

4.2.1 ACTIVE ENFORCEMENT OF EXISTING LAWS IS NEEDED

Effective enforcement is a vital prerequisite for a successful fight against poaching and illegal wildlife trade. Tight inland and border controls – especially at the external frontier of the EU i.e. to Moldova, Ukraine and Turkey – and good national and cross border cooperation are crucial.

According to Knapp (2008)[13] only a few EU Member States are paying special attention to the caviar trade, which can be a potential reason why there are problems with labels or inconsistencies between information on permits and labels.

Illegal caviar trade is not only an issue regarding the protection of endangered species but it may also involve contraband and organized crime. Furthermore, it concerns taxation – with lost tax revenues for the countries – as well as health and veterinary issues. Therefore controls in this regard should be of high priority for Bulgaria and Romania and the EU more widely, particularly in areas of market growth such as aquaculture and online sales.

Consequently, the following specific recommendations are made:

- In order to improve inter-agency coordination at the national level, national authorities responsible for the control of trade in wildlife and fisheries – including the national CITES Management and/or Scientific Authorities – are recommended to establish formal or informal groups (where this is not already happening). Such inter-agency coordination groups should organize regular meetings and communicate using electronic and other means inter-sessionally. The meetings and frequent exchange of information and experience could help prioritize and focus enforcement effort on areas of key concern and assist in planning and carrying out joint and co-ordinated controls, where those are most needed.

- As sturgeon stocks are shared between Romania and Bulgaria, coordination of enforcement action between these two countries is recommended in order to maximize effectiveness. This coordination could take place in the form of regular cross-border meetings and information exchange.

- Enforcement agencies, assisted by the CITES Management Authorities, should share information about caviar and sturgeon seizures and investigations with their counterparts in implicated countries (e.g. countries of origin, transit or destination).

4.2.2 DNA TESTING CAN SUPPORT LAW ENFORCEMENT

As the results of this market survey show, random controls using genetic techniques are necessary to guarantee effective monitoring of caviar trade. This needs to include caviar containers with CITES labels, as the integrity of these labels can be flawed.

This was already outlined in a workshop on caviar trade by the Leibniz-Institute for Zoo and Wildlife Research, Berlin, in 2006[14]. The authors of a caviar survey in the USA also stated that their research results underscore the value of DNA testing for enforcement of regulations and, if used by inspection officials in real time, can help detect and discourage illegal harvesting[34].

DNA and other investigatory analysis need to be carried out by laboratories that ensure highest scientific standards and up-to-date technology in order to achieve reliable results which would also be valid in prosecutions. Such methodologies or institutions could be specifically certified or accredited according to international standards.

[34] International Regulation Curbs Illegal Trade of Caviar
http://www.sciencedaily.com/releases/2012/07/120725200043.htm

The preparedness of national institutions for carrying out the required DNA tests should be investigated (including information about cost) and where the recognized methodologies are available, these should be utilized in enforcement. If no national institution can carry out the tests, the possibility of expanding their profile for these should be explored. Samples could also be analysed in other EU Member States, which have the relevant expertise or resources.

As DNA analysis cannot differentiate wild from farmed caviar, other techniques, such as the investigation of isotopes or fatty acids, should be further developed and employed on a larger scale.

4.2.3 FURTHER STANDARDISATION OF CITES CAVIAR LABELS

This research supports recommendations from elsewhere (Knapp 2008)[13] that enforcement authorities need to pay more attention to checking the authenticity of labels. Each EU Member State should make sure that any caviar container on the domestic market is labelled correctly, regardless if the caviar is produced or processed in their territory or if it is imported. A compilation of official caviar labels of all EU Member States can be obtained from the European Commission and/or the EU Member States concerned.

Moreover, labelling should be improved and requirements for labels amended in order to ensure the reliability and effectiveness of labelling. The provision of certain security elements, which cannot be falsified easily (e.g. holograms), as well as the production of caviar CITES labels by CITES Management Authorities or State Printing Companies (as done e.g. in Hungary) could help reduce cases of falsified labels. In addition, a compulsory design of CITES labels could facilitate controls for enforcement officials, as currently there is felt to be too much diversity in label layouts.

4.2.4 INFORMATION REGARDING AQUACULTURE OPERATIONS NEEDS TO BE MORE CAREFULLY COLLECTED

Available data on aquaculture production do not appear very reliable and are subject to considerable variation. Law enforcement agencies and CITES Management Authorities need to ensure that the produced volumes of caviar correspond with the age, number and species of sturgeons in the respective farms and if the caviar sold as “captive-bred” is actually from a female of which both parents were already born in captivity, as defined by CITES. Therefore, it is recommended that the relevant authorities collect such information regularly (for instance annually) and share these with the relevant enforcement agencies who should look to prosecute any farms breaking the law.

The discrepancies regarding companies listed in the official CITES register should also be clarified. It should be ensured that all caviar-producing aquaculture companies are licensed by the national Management Authorities, as defined in Article 66, paragraph 7, of Regulation (EC) No 865/2006, amended by Regulation (EC) No. 100/2008, and that all companies exporting caviar are registered as such with CITES.

With the ban in place both in Romania and in Bulgaria, at present only sturgeon breeding facilities are allowed to take Danube sturgeons from the wild in order to enhance their broodstock. Therefore, it is extremely important that the relevant enforcement agencies implement strict controls and close monitoring to ensure that wild sturgeons taken for reproduction are caught and kept under ideal conditions to avoid mortalities and that all fish are released again as soon as possible.

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5. APPENDIX

5.1 MAP OF ROMANIA

Source: http://europa.eu/abc/maps/members/romania_de.htm

5.2 MAP OF BULGARIA

Source: http://europa.eu/abc/maps/members/bulgaria_de.htm

5.3 STURGEON SPECIES CODES

CITES species code	Scientific name	English name
BAE	*Acipenser baerii*	Siberian sturgeon
BAI	*Acipenser baerii baicalensis*	Baikal sturgeon
BVI	*Acipenser brevirostrum*	Shortnose Sturgeon
DAB	*Acipenser dabryanus*	Yangtze Sturgeon
FUL	*Acipenser fulvescens*	Lake Sturgeon
GUE	*Acipenser gueldenstaedtii*	Russian Sturgeon
MED	*Acipenser medirostris*	Green Sturgeon
MIK	*Acipenser mikadoi*	Sakhalin Sturgeon
NAC	*Acipenser naccarii*	Adriatic Sturgeon
NUD	*Acipenser nudiventris*	Ship Sturgeon
OXY	*Acipenser oxyrhynchus*	Atlantic Sturgeon
DES	*Acipenser oxyrhynchus desotoi*	Gulf Sturgeon
PER	*Acipenser persicus*	Persian Sturgeon
RUT	*Acipenser ruthenus*	Sterlet
SCH	*Acipenser schrenckii*	Amur Sturgeon
SIN	*Acipenser sinensis*	Chinese Sturgeon
STE	*Acipenser stellatus*	Stellate Sturgeon
STU	*Acipenser sturio*	European Sturgeon
TRA	*Acipenser transmontanus*	White Sturgeon
DAU	*Huso dauricus*	Kaluga Sturgeon
HUS	*Huso huso*	Beluga Sturgeon
SPA	*Polyodon spathula*	American Paddlefish
GLA	*Psephurus gladius*	Chinese Paddlefish
FED	*Pseudoscaphirhynchus fedtschenkoi*	Syr-darya Shovelnose Sturgeon
HER	*Pseudoscaphirhynchus hermanni*	Small Amu-dar Shovelnose or Dwarf Sturgeon
KAU	*Pseudoscaphirhynchus kaufmanni*	Large Amu-dar or False Shovelnose Sturgeon
ALB	*Scaphirhynchus albus*	Pallid Sturgeon
PLA	*Scaphirhynchus platorynchus*	Shovelnose Sturgeon
SUS	*Scaphirhynchus suttkusi*	Alabama Sturgeon
MIX	Mixed species (for “pressed” caviar exclusively)	
YYYxXXX	Hybrid specimens: code for the species of the male x code for the species of the female	

5.4 SPECIMENS OF LICENSED CITES CAVIAR LABELS - BULGARIA

Agamemnon I:

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BELUGA Inc Vidin:

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Parpen Chobanov Ltd.:

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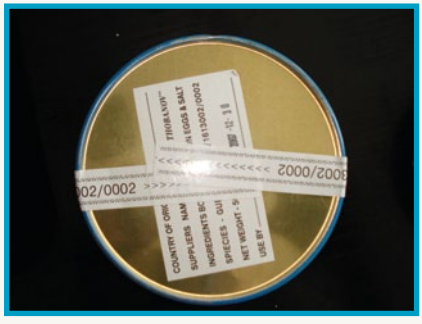

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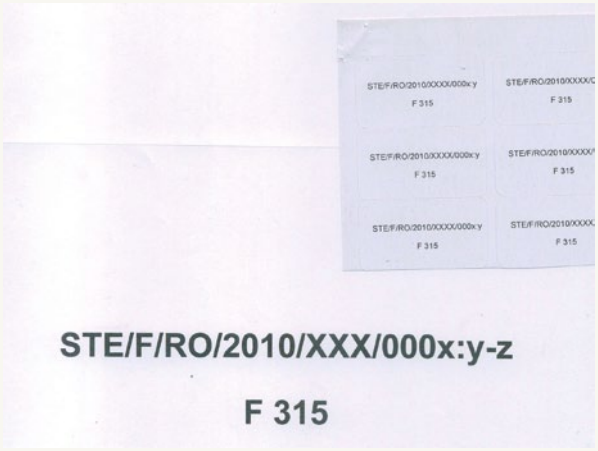
5.5 SPECIMENS OF LICENSED CITES CAVIAR LABELS - ROMANIA

Aquarom Elite Distribution:



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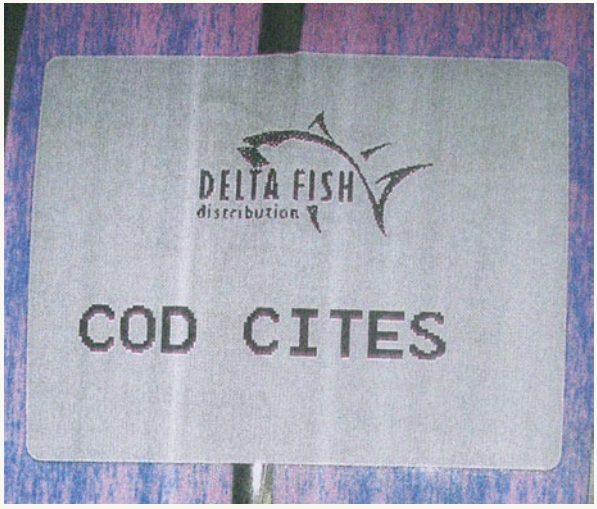
Delta Fish Distribution:



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100 +

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5 000 +

WWF has more than 5,000 staff worldwide

5 M

We have more than 5 million Supporters

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