

SUMMARY

The Sterlet *Acipenser ruthenus* is a freshwater species and is the smallest species of sturgeon. It reaches sexual maturity in just 3-8 years with an average life span of 15 years. It originally inhabited the rivers of Eurasia, being widely distributed in rivers flowing into the Caspian, Black, Baltic, White, Barents and Kara Seas and the Sea of Azov. In the Russian Federation, populations are now thought to be virtually extirpated from three Siberian rivers, Ob', Irtysh and Yenisey, being currently found mainly in the Volga River. The Danube is a stronghold for the species and in recent years, catches have been reported as far upstream as Austria.

Historically, the highest catches were recorded in the Danube River basin (63.5 tonnes (t) average annual catch from 1958 to 1981), and in the Siberian rivers (average annual catch in the 1990s of 69 t), while the Caspian Sea has yielded only 1-2 t annually since 1997. Nowadays, the main commercial catches are reported from the Danube River basin range States: Bulgaria, Romania and the former Yugoslavia. Recorded catches in the Russian Federation decreased by around 50% between 1990 and 1996, and commercial catch of the species has been prohibited in the Yenisey River. Re-stocking of the species is reported in Bulgaria, Hungary and the former Yugoslavia, but none in the Russian Federation. The majority of international trade is composed of live juveniles produced in aquaculture. In 1998, Hungary exported 90,000 and the Russian Federation 2,000 juveniles raised in aquaculture. Additionally, the Russian Federation exported 4 kg of eggs (probably fertilised eggs) in 1998. No export quotas were in place for live juvenile sturgeon in 1998, 1999 and 2000. Only the Russian Federation has established export quotas for *A. ruthenus* in 2000: 300 kg of caviar, 2 t of meat and a total of 125 kg of fertilised eggs for the species and three hybrids.

DISTRIBUTION AND POPULATION

The CITES database gives the distribution of *Acipenser ruthenus* as: Austria, Bosnia and Herzegovina, Bulgaria, Czech Republic, Georgia, Germany, Hungary, Kazakhstan, Latvia, Lithuania, Romania, Russian Federation, Slovakia, Slovenia, Switzerland, Ukraine and former Yugoslavia (including Croatia and Serbia) (Anon., 2000a).

A. ruthenus is classified as Vulnerable by IUCN (1996):

VU A1c Austria, Bosnia and Herzegovina, Czech Republic, Germany, Hungary, Kazakhstan, Latvia, Lithuania, Romania, Russian Federation, Slovakia, Switzerland, Ukraine, Yugoslavia

Caspian and Black Sea drainage stock: VU A1cd Hungary, Romania, Russian Federation, Ukraine, Yugoslavia [Mediterranean and Black Sea]

Russian stock: VU A1c Russia [Irtysh, Ob and Yenisei rivers]

Austria: *A. ruthenus* has a limited distribution in the Danube and Drava rivers (Honsig-Erlenburg and Schultz, 1989; Jungwirth, 1975; Schiemer and Spindler 1989, cited in Dr J. Holcik, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000). It is recorded as Endangered (Anon., 1997).

Bulgaria: *A. ruthenus* occurs in the Danube River and previously, in the lower courses of its tributaries. However, population density and catch have decreased in recent years (Karapetkova *et al.*, 1995, cited in Dr J. Holcik, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Czech Republic: *A. ruthenus* occurs in the lower course of the Morava River (the western tributary of the Danube River), and its tributary, the Dyje River (Dr J. Holcik, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000). The status of the species has not been evaluated (Lusk and Hanel, 1996b, cited in Dr J. Holcik, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Germany: *A. ruthenus* has been extirpated (Dr J. Holcik, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Hungary: *A. ruthenus* is considered to be common (Pintér, 1991; A. Ronyai, *in litt.* to IUCN/SSC Wildlife Trade Programme, 8 August 2000). No information is available on population size, but it is thought to occur in all major rivers: Berettyó, Danube, Dráva, Korös, Maros, Mura, Rába, Szamos and Tisza (CITES Management Authority of Hungary, *in litt.* to TRAFFIC Europe, 13 September 2000).

Moldova: The Moldovan range on the Danube River is 811 m and sturgeon also occur in the Pruth River, a tributary of the Danube River (junction at km 137th) (Anon., 2000c). The species also occurs in the Dniester (or Nistru) River (Sokolov and Vasil'ev, 1989).

Romania: The range of *A. ruthenus* in the Danube River increased in the 1980s due to improved water quality, but has now diminished due to overfishing (Pr N. Bacalbasa-Dobrovici, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000). The range is fragmented (Dr N. Patriche, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Russian Federation: In the Caspian Sea region, *A. ruthenus* occur throughout the course of the Volga River including reservoirs and in many of its major tributaries. The most recently published information concentrates on the Vyatka River population, which was reported to be abundant in the 1990s (Kuznetsov *et al.*, 1995). The species is rarely encountered in the Ural River. In the Sea of Azov basin, *A. ruthenus* was recorded from the Don and Kuban Rivers, but there are no current records.

In the White and Barents Sea drainage, *A. ruthenus* inhabited the Northern Dvina River basin, though there is no current information on its status. *A. ruthenus* also once inhabited the Ob', Irtysh and Yenisey Rivers in Siberia, but is now thought to be virtually extirpated from these (Birstein, 1993). Introduced populations occur in the Pechora and Western Dvina rivers (Anon., 1997).

Slovakia: Classified as Vulnerable, *A. ruthenus* occurs in the Danube River and its main tributaries, the Morava, Váh, Hron, Ipec and Tisa rivers. The species had a limited distribution until 1970 due to pollution, but improved water quality has coincided with increased distribution and catch (Holcik, 1995).

Ukraine: Listed in the Red Data Book of Ukraine (Gringevsky, 1995), *A. ruthenus* occurs in the lower Danube and the Dniester rivers where its distribution is limited since the construction of the Dubosary dam. On rare occasions it is found in the Dnieper and Bug River systems and some of their tributaries. Population density has decreased since the construction of the dam (Pavlov, 1980).

Former Yugoslavia: No information is available for Croatia. In Serbia, *A. ruthenus* occurs in the Danube and the lower parts of the Sava and Tisa rivers (Jankovic, 1993). In Slovenia, the species is considered Vulnerable and in decline (Povž and Sket, 1990).

Introduced populations:

Germany: In the Baltic Sea river estuaries, east of Rostock (Germany), and further upstream, hybrid sturgeon specimens have been caught. They probably originate from upstream aquaculture farms and/or aquaria ("specimens that had grown too large to be kept in the private aquaria") (Jörn Gessner, Scientist at the Institute of Freshwater Ecology and Inland Fisheries, pers. comm. to TRAFFIC Europe, 15 March 2000).

Italy: *A. ruthenus* has been introduced in captive breeding facilities in Italy in 1990s (Agroittica Lombarda and Azienda Agricola, Italian sturgeon farmers, *in litt.* to TRAFFIC Europe-Italy, 1999). There is no documentation on the potential damage of the introduction of exotic Acipenseriformes on local species. If specimens of *A. ruthenus* escape into the Po River, they may threaten the Adriatic Sturgeon *Acipenser naccarii*, which is on the brink of extinction.

HABITAT AND ECOLOGY

A. ruthenus is the smallest of all sturgeon species, usually reaching a total length of 1 m and a weight of up to 6.5 kg (Anon., 1997). The maximum age is reported to be 27 years, and sexual maturity is reached at 3-5 years in males and 5-8 years in females (Hochleithner and Gessner, 1999). It occurs in freshwater

and prefers deep depressions in rivers with a stony, gravely or sandy bed. It is a benthic feeder with a diet of insect larvae, small molluscs and invertebrates. It does not undertake long migrations. During the spawning season, *A. ruthenus* feed on sturgeon eggs of other species.

THREATS TO SURVIVAL AND DOMESTIC USE

The damming of virtually all rivers in the range of the species began in the 1930s and led to a sharp decline in spawning habitat. Spawning success is related to the water level which in turn is controlled by hydroelectric power stations; lowered water levels in rivers can cause mass death of fingerlings (Jankovic, 1993). Reduced flow velocity has also led to degeneration in the reproductive system (Lukin *et al.*, 1981, cited in Anon., 1997). Increasing pollution (oil products, phenols, PCBs, mercury etc.) in the Volga River System and Siberian rivers in recent years has threatened the survival of *A. ruthenus* (Romanov and Altuf'ev, 1993). Studies of sympatric species have shown degeneration of the reproductive system, liver and muscle tissue as a result of pollution. Lukin *et al.*, (1981, cited in Anon., 1997) found that specimens in large water reservoirs of the Volga River grew unusually quickly but did not mature. The newly constructed Novodnestrovskaya hydro power station has lowered the spring and summer water temperatures to 5-6°C and has caused reproductive problems for *A. ruthenus* and other sturgeon in the Middle Dniester (Sarapanovscaia, 1999).

In the Danube River, from 1958 to 1981, catches of *A. ruthenus* ranged from 117 t (in 1963) to 36 t (in 1979) and averaged 63.5 t per annum for this 24-year period. The average share of these annual catches were distributed amongst the Danube countries as follows: former Yugoslavia averaging 57.5% of the total catch from 1958 to 1981, Bulgaria 21.8%, Romania 10.5%, Hungary 3.5% and the former Czechoslovakia 0.5% (Hensel and Holcik, 1997). Little data are available on recent and current catch data of *A. ruthenus* in the Danube River basin.

Bulgaria: Wild populations of sturgeon have been threatened by the decrease in the number of spawning grounds on the Danube River as a result of human development, particularly hydroelectric facilities. The long lasting unregulated fisheries have disrupted the age composition of the populations due to selective catch of sexually mature fish, and incidental catch of young sturgeon in nets set to catch other species when the juveniles migrate to the sea. Water pollution has also influenced the metabolism of the fish (CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000).

Annual catch of *A. ruthenus* (tonnes)

	1995	1996	1997	1998	1999
<i>A. ruthenus</i>	0.1	0.8	0.8	1.2	1.5
Total sturgeon catch	14.7	32.5	49.8	55.9	50.5
n° of licenses issued	0	0	122	155	169

Source: CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000

Domestic consumption of caviar in Bulgaria is limited to 7-10% of the total Bulgarian caviar production. All sturgeon meat production is consumed in Bulgaria.

Hungary: *A. ruthenus* is the only species of sturgeon commonly found in Hungary. Estimated annual catches range from 3-20 t (Pintér 1991; A. Ronyai, *in litt.* to IUCN/SSC Wildlife Trade Programme, 8 August 2000). Hungary is not involved in caviar production. From 1997 to 1999, the following catches were recorded: 1997- 14.2 t, 1998 - 9.5 t, 1999 - 34.9 t (CITES Management Authority of Hungary, *in litt.* to TRAFFIC Europe, 13 September 2000).

Romania: There are many small populations of *A. ruthenus* in the Danube River, but no records of national catch levels (Dr N. Patriche, *in litt.* to IUCN/SSC Wildlife Trade Programme, 5 Sept. 2000).

Russian Federation: *A. ruthenus* catch has always been relatively small on the territory of the former Soviet Union, compared with that of major commercial sturgeon species (*Huso huso*, *A. gueldenstaedtii* and *A. stellatus*). This may be partly explained by the small size of *A. ruthenus*, but also because Sterlet caviar is not as valuable as caviar of other species. *A. ruthenus* has been primarily targeted by fishermen to supply the domestic demand (Anon., 2000b).

Catch of *A. ruthenus* (tonnes)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Caspian Sea	?	?	?	?	1	1	1	1	2	2
Water reservoirs of Russia	40.5	57.8	30.4	31.4	29.7	12.3	13.1	24.1	16.8	?
Ob' River	?	?	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Yenisey River	39.2	28.9	63.3	57.2	56.0	64.4	61.9	58.2	42.0	25.9
Northern Dvina River	?	?	7.7	8.0	9.5	7.0	5.0	8.0	4.8	8.9
Total			116.	111.	111.	99.7	96.0	106.	80.6	
			4	6	2			3		

Source: Federal Research Institute of Fisheries and Oceanography of the Russian Federation ("VNIRO"), cited in Anon., 2000a

The level of domestic consumption of sturgeon products in the Russian Federation is unknown, but is said to be the main outlet of illegal sturgeon fisheries (Mr R.V. Ivakhnenko, State Fisheries Committee, pers. comm. to TRAFFIC Europe-Russia, September 2000). Based on the number of sets of illegal fishing equipment recorded by enforcement agencies of the Caspian Sea and the Sea of Azov, the illegal sturgeon catch for all species was evaluated at six to ten times the legal catch (Anon., 2000b). In 1997, the estimated volume of the Moscow sturgeon meat market was three times the annual catch quotas for sturgeon species (Anon., 1998).

Ukraine: Catch of *A. ruthenus* in Ukrainian waters has been prohibited since the species was listed in the Red Data Book of Ukraine in 1992 (Anon., 2000c).

INTERNATIONAL TRADE

The listing of *A. ruthenus* in CITES Appendix II entered into effect on 1 April 1998. Data for this species are therefore limited to nine months of trade (April-December 1998).

Gross exports and the comparative tabulation of trade in *A. ruthenus* are given in the Appendix. CITES Annual Reports for 1998 suggest that live juvenile fish represented the most important trade in *A. ruthenus*. Hungary is the main exporter, exporting more than 95% of the total 92,000 live individuals in trade declared as "F" – First Generation). The European Union (EU) is the largest importer (Germany, the Netherlands, and the United Kingdom (UK)). International trade in live juvenile *A. ruthenus* supplies the sturgeon aquaculture industry and the ornamental fish (aquarium) industry. In Italy, for instance, *A. ruthenus* is imported for ornamental purposes (Dr P. Bronzi *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000). According to 1998 Annual Reports most importing countries do not report live juvenile imports (see Appendix). Possible reasons for this omission are: reporting errors; non-implementation of the CITES requirement to record imports of "live" fish and fertilised "eggs" in CITES Annual Reports; and lack of awareness of the Wildlife Regulation (EC) 338/97 among importers in the EU and therefore lack of applications for import permits for live juvenile sturgeon.

The small size of the species makes it attractive to the apparently increasing meat market (see export quotas for 2000) and because restaurants prefer smaller sized fish.

Exports of *A. ruthenus* from Hungary in 1999

	China	USA	Germany	Slovenia	United Kingdom	Czech Republic	Bulgaria	Netherlands	Belgium
Live fingerlings		4,000	22,000	15,000	10,000	8,000	6,000	5,000	5,000
Fry	200,000								
Fert. eggs	30,000								

Source: CITES Management Authority of Hungary, *in litt.* to TRAFFIC Europe, 13 September 2000

Exports of *A. ruthenus* from Russia in 1999

	Quantity (kg)	Description	Importer	No of permits
<i>A. ruthenus</i>	16.80	Live eggs	DE, CN, US, HU, GR	7 Export
	200.00	Live fish	KR	2 Export
<i>Huso huso</i> x <i>A. ruth.</i>	62.80	Live eggs	PL, DE, JP, CN, LV, US, HU, IL, GR	16 Export
	300.00	Live fish	KR	1 Export

Source: CITES Management Authority of the Russian Federation, *in litt.* to TRAFFIC Europe, 18 September 2000

Export quotas for *A. ruthenus* and its hybrids set by Bulgaria and the Russian Federation (kilogrammes)

	1998		1999		2000		Fertilised Eggs
	Caviar	Meat	Caviar	Meat	Caviar	Meat	
Bulgaria			30				
Russian Federation					300	2,000	5
<i>A. baerii</i> x <i>A. ruthenus</i>							15
<i>A. gueldenstaedtii</i> x <i>A. ruthenus</i>							15
<i>H. huso</i> x <i>A. ruthenus</i>							90
Total	0	0	30	0	300	2,000	125

Source: CITES Notification No.s 1998/35-36-61, 1999/21-47-53-68 and 2000/053

Note: The use of the term "eggs" and the unit "kg" or "g" (see # in Appendix and table on export quotas, above) to describe shipments of both caviar and fertilised eggs complicates the analysis of trade data. Similar difficulties arise from the unit used for export quotas of fertilised eggs, which is kilogrammes ("kg") instead of "number of specimens". Kilogrammes do not directly correspond to the number of specimens, and hence does not allow the effective evaluation of quotas. This confusion is also a source of mis-interpretation of data and is an obstacle to the proper monitoring of international trade, e.g. underestimation of live specimens in trade.

CONSERVATION MEASURES

There are no specific monitoring programmes for *A. ruthenus* in most range States.

Bulgaria: Conservation measures at the national level are needed, but they must be linked to the coordinated activities of all countries in the Black Sea region (CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000). In Bulgaria, sturgeon fisheries are prohibited for 30 days, from 20 April to 20 May which corresponds to the peak of the breeding season. The authorities may allow a 15-day extension of the closed season pending the natural conditions of that year. Explosives, poison, bottom trawling and dragging, as well as stunning substances and other destructive fishing devices are prohibited. The minimum size limit for *A. ruthenus* is 33 cm. Export quotas for all sturgeon species are set on the basis of catch data and trends, as well as the biological characteristics of the species. A system has been established for the distribution of export quotas among export companies. These companies are obliged to restock the Danube River with sturgeon fry before they are authorised to export sturgeon specimens. For example, for a given year, for each kilogramme of caviar exported, the company must release 30 juvenile sturgeon (Anon., 2000c). The restocking programme is controlled by relevant government agencies. It is expected that the first released individuals will return to the Danube River in

2005-2007. Only 300 *A. ruthenus* fingerlings of 15 g were released in Bulgarian waters (Danube River in 1998, for 1999 and 2000 there was no restocking for this species (Anon., 2000c).

Due to budgetary constraints, Bulgaria has not monitored the wild population of any sturgeon species in recent years. However, plans have been prepared for these activities (CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000).

Hungary: Mature and immature individuals of *A. ruthenus*, *A. baerii* and *A. gueldenstaedtii* are bred in captivity as broodstock. Fingerlings of *A. ruthenus* are released in Hungarian waters. The catch of the species is regulated by the Act on Fishery and Sport Fishing by length limitation and with closed season (A. Ronyai, *in litt.* to IUCN/SSC Wildlife Trade Programme, 8 August 2000).

Fish less than 45 cm in length cannot be caught. There is a closed season for fishing the species from 1 March to 31 May. During the open season, the daily limit is three specimens per angler. *A. ruthenus* is not protected by law, but the introduction of hybrids into natural waters is prohibited by the *Nature Conservation Act* (CITES Management Authority of Hungary, *in litt.* to TRAFFIC Europe, 13 September 2000).

Romania: In Romania, the Centre of Research for Fish Farming, Fishing and Fish Processing in Galati is monitoring the status (population sizes/trends) of sturgeon stocks upriver of the Danube Delta (Birstein, 1996). Bacalbasu-Dobrovici (*in litt.* to IUCN/SSC Wildlife Trade Programme Trade Programme, September 2000) believes that fishing pressure should be reduced in the lower Danube. He reports that that the existing legislation pertaining to the region is neither adequate nor enforced, particularly in Romania.

A fishing license is required in Romania to capture this species (Dr N. Patriche, *in litt.* to IUCN/SSC Wildlife Trade Programme Trade Programme, 5 September 2000). Sturgeon fishing gear, for instance the type of net and mesh size, is strictly regulated by Romanian law. The fishing season is set each year by Ministerial Order. A fishing license is required to catch any species of sturgeon in Romanian waters. No minimum size limit or catch quota has been established for *A. ruthenus*. The Romanian restocking programme has not released juvenile Sterlet into the Danube River (Anon., 2000c).

Russian Federation: In the late 1990s, sturgeon commercial catch in the Yenisey River (*A. ruthenus* and *A. baerii*) was prohibited due to rapidly declining populations and the extremely low rate of natural reproduction (Anon., 2000b), caused by inaccessible spawning grounds and impact of pollution on the physiology of fish (Ruban, 1997). In 2000, catch of *A. ruthenus* for scientific and monitoring purposes, as well as for local subsistence use, is limited to 5 t in the Yenisey River. In the Ob'-Irtys' rivers basin, the Total Allowable Catch (TAC – as calculated by VNIRO and accepted by the independent Council of experts) should not exceed 10 t (Anon., 2000b).

Export quotas established by the CITES Management Authority for Acipenseriformes of the Russian Federation consist of 90% of the total caviar production in the country. This in turn depends on the catch quotas set for each species of sturgeon (Mr Roman V. Ivakhnenko, State Fisheries Committee, pers. comm. to TRAFFIC Europe-Russia, September 2000). The TAC allocated by the State Fisheries Committee is based on the recommendations of scientific agencies such as VNIRO and the Pacific Research Institute of Fisheries and Oceanography (TINRO). The TAC includes the commercial catch, scientific catch and the catch of mature males and females destined for captive breeding.

There has been no release of *A. ruthenus* fry by Russian hatcheries in the Volga River (Anon., 2000b). Recent data on the monitoring of catch per species, including the size composition and sex ratio of fish caught are not available. The domestic consumption of sturgeon products in the Russian Federation, mostly meat and caviar, is unknown (Mr Roman V. Ivakhnenko, State Fisheries Committee, pers. comm. to TRAFFIC Europe-Russia, September 2000).

Ukraine: Catch of *A. ruthenus* in Ukrainian waters is prohibited since the species was listed in the Red Data Book of Ukraine in 1992 (Anon., 2000c; Gringevsky, 1995).

Yugoslavia: It seems that *A. ruthenus* is permitted to be fished throughout the year. Certain types of fishing gear are prohibited to catch sturgeon by Yugoslavia law, and an agreement has been signed between Romania and Yugoslavia on the prohibition of gear that cause high mortality of untargeted fish. Any fishing activity in Yugoslav waters, including all commercial and sport fisheries, requires a license. The licenses are issued on a per district basis. The minimum size limit for *A. ruthenus* is set at 33 cm, but catches of the species have been prohibited from 1996 to 2000. A restocking programme is being carried out by the Centre for fish reproduction of the "Djerdap Fishing Company" in Malla Vrbica village. Data on sturgeon juvenile release have not been provided (Anon., 2000b).

CAPTIVE BREEDING

The species is produced in aquaculture in most of the warm water ponds in the Russian Federation, Ukraine, Hungary and Germany for domestic meat markets. The species has been bred in captivity since 1993 and stocking programmes are in place for the Danube and Drava rivers (M. Hochleithner, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

In the Dniester River, Moldova, limited quantities of *A. ruthenus* were bred in ponds for fishing from 1980 to 1988 (Lobchenko *et.al.*, 1996).

A. ruthenus has been introduced into aquaculture in Belgium (W. Verdonck, sturgeon farmer, pers. comm. to TRAFFIC Europe, July 2000), Italy (Agroittica Lombarda and Azienda Agricola, Italian sturgeon farmers, *in litt.* TRAFFIC Europe-Italy, 1999) and France (Welcomme, 1988). The size of the broodstock is not known. In European countries, a hybrid of *H. huso* and *A. ruthenus* called 'bester' is subject to aquaculture; it is fast growing and produces fertile and early maturing offspring (Burtsev, 1997).

According to FAO Fishstat, the world annual production of farmed sturgeon and paddlefish (mostly for the meat market) has increased rapidly, from 160 t in 1987 to 2,576 t in 1998. Species specific data are not available in the FAO database, but according to trade data there is currently a significant production of *A. ruthenus* juveniles in commercial farms (see Appendix).

Bulgaria: A fish farm was established in 1997 in Boliartzi village (Plovdiv region). It is the only existing hatchery. All juveniles released in the Danube River in Bulgaria from 1998 to 2000 were produced there. The hatchery has a total capacity of 60,000 juveniles. Since 1999, attempts have been made to breed sturgeon in artificial water basins near Sofia (CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000).

Hungary: Through captive breeding and imports of fertilised eggs (from the Russian Federation), tens of thousands of fry and fingerlings are reared annually in Hungary. Most of them are exported, but some are kept until they reach a marketable size for the domestic market (A. Ronyai, *in litt.* to IUCN/SSC Wildlife Trade Programme, 8 August 2000). There are two major exporters of live fingerlings who have broodstock of *A. ruthenus*. These stocks consist of wild collected females and captive bred specimens. Other exporters do not have breeding stocks, but obtain eggs from wild caught females and fertilize them artificially. They export fertilised eggs, yolk sac fry and fingerlings. There are no sturgeon hybrids in captive breeding facilities (CITES Management Authority of Hungary, *in litt.* to TRAFFIC Europe, 13 September 2000).

Poland: The presence of fish farms and hatcheries of sturgeon in Poland was confirmed by the CITES Management Authority of Poland. The list of sturgeon species bred in captivity in Poland is as follows: *Acipenser baerii*, *A. gueldenstaedtii*, *A. ruthenus*, *A. stellatus*, *Huso huso*, *Polyodon spathula* and hybrids of some species. In most cases, hybrids are F1 generation live specimens (fertilised eggs) imported into Poland from range States, particularly from the Russian Federation. Some farms keep F2 generation specimens, bred in Poland and used as broodstock, partly for the production of juveniles to be sold on the domestic market and exported (Dr Z. Krzeminski, Deputy Director, *in litt.* to TRAFFIC Europe, 31 August 2000).

United States of America: Sturgeon are in the preliminary stage of captive breeding in Hawaii (USFWS, CITES Management Authority, *in litt.* to TRAFFIC Europe, September 2000), but no detailed information has been provided on the species concerned.

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APPENDIX

Gross exports* of *Acipenser ruthenus* 1998

TAXON	TERM	UNI	Exporter	1998
<i>Acipenser ruthenus</i>	eggs #	kg	RU	4
<i>Acipenser ruthenus</i>	live		CZ	0
<i>Acipenser ruthenus</i>	live		GB	300
<i>Acipenser ruthenus</i>	live		HU	89,700
<i>Acipenser ruthenus</i>	live		RU	2,000
<i>Acipenser ruthenus</i>	live	kg	RU	50
<i>Acipenser ruthenus</i>	specimens		DE	0

Comparative tabulation of *Acipenser ruthenus* 1998

Year	Imports reported				Exports reported								
	Imp	Exp	Origin	Quantit	Unit	Term	P	S	Quantit	Unit	Term	P	S
1998	JP	GB	HU						300		live	T	F
1998	BE	HU							5,000		live	T	F
1998	BG	HU							1,200		live	T	F
1998	DE	HU							40,000		live		
1998	DE	HU							2,000		live	T	F
1998	GB	HU							11,500		live	T	F
1998	NL	HU							20,000		live	T	F
1998	SI	HU							10,000		live	T	F
1998	KR	RU							2,000		live	S	F
Sub-total									92,000		Live fish		
1998													
1998	CN	RU							2 kg	#	eggs	T	F
1998	GR	RU							2 kg	#	eggs	T	C

* **Definition:** "Gross exports are the sum of all reported exports and re-exports in a particular commodity or species in a particular year or series of years. Gross trade is thus a simple measure of the total number of items recorded in international trade. However, gross trade may be an overestimate of the total number of actual specimens in trade as re-exports are not deducted from the total." (Anon., 1996).

This is particularly applicable to caviar of which shipments are often exported, re-packaged and re-exported. For instance, in the mid-1990s, Germany re-exported as much as 45% of its annual caviar imports (De Meulenaer and Raymakers, 1996).