

Huso huso Gray, 1827

**Beluga
Giant Sturgeon**

Order: ACIPENSERIFORMES

Family: ACIPENSERIDAE

SUMMARY

Beluga *Huso huso* has a wide distribution. It occurs in the Caspian Sea, Black Sea and the Sea of Azov and many of the tributaries of these seas including the Volga and Danube rivers. It is the largest species of Acipenseriformes reaching a length of six metres and a weight of more than one tonne. The Volga River is the major spawning river for the species. However the construction of dams on virtually all these rivers has significantly reduced the spawning area. Currently, 96% of *H. huso* in the Volga River consist of hatchery-reared fish. Captive breeding does not compensate for the loss of natural reproduction and *H. huso* continues to decline. In addition to loss of habitat, the species has been subject to overfishing and egg-production has been disrupted due to environmental pollution.

Historically, *H. huso* were harvested more intensively than Russian Sturgeon *Acipenser gueldenstaedtii* or Stellate Sturgeon *A. stellatus* (Khodorevskaya *et al.*, 1997). The catch of *H. huso* in the northern Caspian Sea dropped from approximately 2,800 tonnes (t) in 1970 to less than 300 t in 1994. Available data suggest that the Caspian Sea catch of *H. huso* in 1997 was 339 t. The species was always abundant in the Danube River, with an average of 23 t caught annually in the middle Danube River from 1972 to 1976. This catch decreased to 7.5 tonnes per year from 1985 to 1989 after the construction of Djerdap dams I and II. More recently, recorded landings from the Lower Danube River in Romania and Bulgaria decreased from 62.1 t in 1997 to 42.7 t in 1999. The importance of domestic markets of caviar and sturgeon meat is unknown in the Russian Federation. In Iran, for the past five years, the domestic consumption has been estimated at 5% and 65% of the country's respective production of caviar and meat. In 1998, exports of *H. huso* totalled 21,267 kg of caviar (8,035 kg from the Russian Federation, 7,033 kg from Kazakhstan and 4,013 kg from Iran) and 15,755 kg of meat and 22 skins from Iran, destined for Italy and Switzerland, respectively. Assuming that 6-7 kg of caviar is obtained per 100 kg of sturgeon caught (both male and female), the total approximate volume of the 1998 catch, i.e. 21.3 t of caviar, would represent a catch of 304-354 t. Caviar export quotas for 1998 were set at 5 t by Iran, 2.5 t by Bulgaria and 5 t by the Russian Federation. For 1999, the Russian Federation's caviar export quota was set at 3 t; export quotas were exceeded in 1998 and 1999 by 3 t and 2.7 t respectively. The combined export quotas set by range States have increased from 16.6 t to 17.5 t of caviar, and from 15.5 t to 56 t of meat for 1999 and 2000, respectively. .

DISTRIBUTION AND POPULATION

The CITES database lists the distribution of *H. huso* as: Azerbaijan, Bulgaria, Czechoslovakia, Georgia, Hungary, Iran, Italy (ex), Kazakhstan, Moldova, Romania, Russian Federation, Turkey, Turkmenistan, Ukraine and former Yugoslavia (Anon., 2000a).

H. huso is classified as Endangered by IUCN (1996):

EN A2d Azerbaijan, Bulgaria, Hungary, Iran, Italy, Kazakhstan, Moldova, Romania, Russian Federation, Turkmenistan, Ukraine, Yugoslavia

Sea of Azov stock: CR A1acde + 2d Russia [Mediterranean and Black Sea]

Black Sea stock: EN A1acde + 2d Hungary, Romania, Russian Federation, Ukraine, Yugoslavia [Mediterranean and Black Sea]

Caspian Sea stock: EN A1acde + 2d in Azerbaijan, Iran, Kazakhstan, Russian Federation, Turkmenistan

Adriatic Sea stock: EX Italy [Mediterranean and Black Sea].

H. huso is historically widespread, inhabiting the Caspian and Black seas and the Sea of Azov. The most recent record of the species in the Sea of Azov is from the mid 1980s (Volovik *et al.*, 1993), when *H. huso* was believed to make up 3% of the total sturgeon biomass. It is now believed extinct in the Adriatic where historically, solitary individuals occurred. The last report of the species in the Po River Basin is from 1972 (Rossi *et al.*, 1991).

A seasonal migration occurs in the Caspian; in the summer the main feeding grounds are in the north and in the winter in the south (Barannikova *et al.*, 1995). There are no estimates of the total population size. The main spawning population enters the Volga; the other spawning populations of the Caspian are thought to be minimal (Khodorevskaya and Novikova, 1995; Levin, 1997; Vlasenko, 1990).

Azerbaijan: Historically the species spawned in the Kura River, but more recent information suggests that *H. huso* no longer use the Kura River (Khodorevskaya *et al.*, 1997; Levin, 1997). The coastal waters of Azerbaijan are important feeding grounds for *H. huso*, which feeds primarily on fish such as sprat and *kilka* (Clupeidae) (CITES Management Authority of Azerbaijan, *in litt.* to TRAFFIC Europe, 18 September 2000).

Bulgaria: Part of the Black Sea population, *H. huso* in the Danube River breed in spring (early April - when the first catch of the year are recorded) and in autumn (end-September) (CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000).

Czech Republic: *H. huso* is extinct, with the last specimen being caught in the Morava River at Lanžhot at the beginning of 20th century (Holcík, 1995).

Georgia: The southeast coast of the Black Sea is an important feeding and wintering area for sturgeon (*H. huso*, *Acipenser stellatus*, *A. nudiiventris*, *A. persicus colchicus* and *A. sturio*) that migrate upstream in a number of rivers for spawning. The main rivers used are the Supsa, Inguri, Chorokhi, and particularly the Rioni (Zarkua and Tsuladze, 1999).

Hungary: Historically, Hungary formed the main spawning ground for this species in the Danube, but catches began to decline from the 16th century onwards. Very few were taken during the early 20th century. The last specimen caught in 1987 was an exceptional rarity and the species is regarded as extinct in Hungary (Pintér, 1991).

Iran: Razavi (1988) notes that *H. huso* enters the Sefidrud, Tajen and Gorganrud rivers in the southern shores of the Caspian Sea for spawning. This species is considered one of the most valuable sturgeon species of Iran. It migrates during February to April, but sometimes is also seen in these rivers during the autumn months. However, Dr J. Holcík (*in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000) maintains that the Mangil Dam on the Sefidrud River prevents sturgeon from entering this river where all spawning grounds have been destroyed due to heavy pollution and water extraction (pumping). Hensel and Holcík (1997) suggest that *H. huso* no longer use the Sulak River for spawning. According to Dr M. Pourkazemi (*in litt.* to IUCN/SSC Wildlife Trade Programme, 25 September 2000), among the Mangil Dam and other dams constructed on the Sefidrud River, there is a remaining distance of 45 km from the dam closest to the estuary, and fish are still observed entering the river to spawn.

Kazakhstan: *H. huso* spawns naturally in the Ural River and since 1979, the numbers entering the Ural have exceeded those entering the Volga (Khodorevskaya *et al.*, 1997).

Moldova: The Moldovan range on the Danube River is 811 m. Sturgeon also occur in the Prut River, a tributary of the Danube River (junction at km 137th)(Anon., 2000c). In the early 1990s, *H. huso* had not been recorded for two decades (Chepurnova, 1991).

Romania: The Danube River has the only current *H. huso* spawning population in the Black Sea Basin. However, the population has been extirpated in the upper part of the river and is critically endangered in the central region because of overfishing, pollution and damming (Bacalbasa-Dobrovici, 1997; Hensel and Holcík, 1997; Suciú *et al.*, 1998).

Russian Federation: The largest population is believed to occur in the Volga River (Vlasenko, 1990). Levin (1997) estimated that the spawning population entering the Volga in recent years is approximately 8,000-9,000 individuals, up to 25% of which are female. The decline in commercial catches from this region (northern Caspian Sea) from 2,650 t in the 1970s to 460 t in 1993, reflect a decline in the population. Recent information suggests that *H. huso* no longer use the Terek River (Khodorevskaya *et al.*, 1997). In the Sea of Azov, some natural spawning grounds are no longer accessible due to the construction of dams on

the Don and Kuban rivers (Anon., 2000b). The biomass of Beluga in the Sea of Azov, was estimated to be around 1,770 t in the mid-1980s, before a mass die-off of various sturgeon species (Volovik *et al.*, 1993).

Slovakia: The last *H. huso* recorded in the Slovakian-Hungarian portion of the Danube was in 1925 (Hensel and Holcík, 1997).

Slovenia: There are no records of *H. huso* occurring in Slovenia (Povž and Sket, 1990).

Turkey: The Coruh River is used for spawning by *H. huso*, and unidentified sturgeon species have been reported in small numbers in the Sakarya and Mert Rivers (Edwards and Doroshov, 1989). In the late 1980s, local fishermen estimated that only five to six gravid female sturgeon could be taken from the Yesilirmak to supply a hatchery and up to 20 from the Kizilirmak (Edwards and Doroshov, 1989).

Turkmenistan: No information provided.

Ukraine: *H. huso* is known from the east and west coasts of the Crimea. It is also known from the north-western part of the Black Sea, from where it enters the Danube, Dniester, Dnieper, and occasionally the Bug rivers. Its distribution was limited in the last century by pollution and the damming of these rivers (Pavlov, 1980). The biomass of *H. huso* in the Sea of Azov was estimated to be around 1,770 t in the mid 1980s, before a mass die off of sturgeon (Volovik *et al.*, 1993).

Former Yugoslavia: Extinct in Croatia, *H. huso* was formerly recorded in the Sava River at Zagreb and also in its tributary, the Kupa River (Glowacki, 1896; Munda, 1926; Taler 1954). It is Endangered in Serbia. Access to spawning grounds has been prevented by the Djerdap I and Djerdap II dams, and catch has dramatically decreased (Jankovic, 1993; 1996; Simonovic and Nikolic, 1996). There have been no records from Slovenia since at least 1990 (Povž and Sket, 1990).

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

HABITAT AND ECOLOGY

H. huso is the largest of all sturgeon species. It can reach a total length of six metres and more than one tonne in weight (Berg, 1948). Khodorevskaya and Novikova (1995) reported that the mean length of immature males is 2.25 m and females 2.6 m. The maximum reported age is 118 years (Babushkin *et al.*, 1964, cited in Pirogovskii *et al.*, 1989). Sexual maturity is reached at 10-16 years for males and 14-20 years for females; the average size at first spawning is 2 m and 50 kg (Hochleithner and Gessner, 1999).

H. huso is piscivorous and begins to prey upon other fish in an early life stage. The species is anadromous and enters rivers flowing into the Black, Caspian and Sea of Azov to spawn. There are two forms; one of which spawns in winter and one in spring. The spring form migration peaks in summer and ends in late autumn. Fish migrating in winter are the largest of the two forms. They hibernate and reproduce the following year whereas the spring form migrates and reproduces during the same year. Unlike *A. gueldenstaedtii* and *A. stellatus*, *H. huso* do not congregate and remain dispersed in winter and summer (Levin, 1997).

Based on catches and caviar production in the late-1970s, the rate of caviar extracted per fish caught was estimated at 7 kg per 100 kg of the total catch (including males and females) for the three main commercial species of the northern Caspian Sea, *H. huso*, *A. gueldenstaedtii* and *A. stellatus* (Doroshov and Binkowski, 1985, cited in Williot and Bourguignon, 1991).

Iran: On the Iranian coast of the Caspian Sea, *H. huso* is primarily found in the eastern regions and in the Turkmen and Gomeeshan ports (Ghazel, 1993, cited in Dr M. Pourkazemi, *in litt.* to IUCN/SSC, Wildlife Trade Programme, September 2000). Sexual maturity in the southern shores of the Caspian Sea is attained

at an average age of 21 years in females (min. 10 years and max. 44 years) and at an average age of 14 years in males (min. 10 and max. 23 years) (International Sturgeon Research Institute, 1998; cited in Dr M. Pourkazemi, *in litt.* to IUCN/SSC, Wildlife Trade Programme, September 2000).

Kazakhstan: Until 1993, the mouth of the Ural River was dredged annually to allow vessels to travel upstream to Atyrau (former Gur'yev) harbour. Since 1993, this annual management of the river channel has not been carried out and is an obstacle to sturgeon migration (Anon., 2000c).

THREATS TO SURVIVAL AND DOMESTIC USE

Since the 1950s, all northern and western Caspian Sea tributaries, with the exception of the Ural River, have been dammed for hydroelectric power production, hence virtually all spawning grounds of the Caspian, Black and Sea of Azov regions have been lost. Approximately 90% of spawning grounds in the Caspian Sea have been lost and 91% of each generation now originates from hatcheries (Barannikova *et al.*, 1995). In the Sea of Azov, 100% of each generation is thought to consist of farm grown fish (Volovik *et al.*, 1993). There are also high levels of pollution in most rivers within its range. *H. huso* are particularly threatened by overfishing since Beluga caviar is highly prized and the species is relatively slow to reach maturity. In the mid 1990s, a period of open sea fishing which caught young and immature sturgeon as by-catch is likely to have destroyed a major component of future sturgeon stocks (Anon., 1997).

The commercial sturgeon catch in the Caspian Sea Basin peaked at 27,300 t in 1977, with *A. gueldenstaedtii* being the most abundant species (79%, 21,550 t), followed by *A. stellatus* (17%, 4,650 t). The remaining 4% (1,100 kg) was shared between various sturgeon species including *H. huso* (Levin, 1997). The catch of *H. huso* in the northern Caspian Sea dropped from approximately 2,800 t in 1970 to less than 300 t in 1994 (Khodorevskaya *et al.*, 1997). The Caspian Sea catch of *H. huso* was 339 t in 1997. The species was formerly abundant in the Danube River, with an average annual catch of 23 t in the middle Danube River from 1972 to 1976. This decreased to an average of 7.5 t/year from 1985 to 1989 after the construction of Djerdap dams I and II (Hensel and Holcik, 1997). More recently, recorded catch from the Lower Danube River in Romania and Bulgaria decreased from 62.1 t in 1997 to 42.7 t in 1999.

In the former Soviet Union and Iran, strict sturgeon fishery legislation had been in effect for decades until the emergence of the three new independent States in the Caspian Sea Basin in 1992 (Azerbaijan, Kazakhstan and Turkmenistan) (De Meulenaer and Raymakers, 1996). Current information suggests that amendments of previous regulations and/or adoption of new legislation are now in effect in most new range States in the Caspian Sea, as well as in the Black Sea (including the Danube River) and the Sea of Azov basins. In the latter, Bulgaria, Romania and Ukraine are the most important sturgeon fishing nations. However, enforcement measures appear to be lacking and numerous experts as well as government officials have reported an increasing pressure of illegal fishing practices and criminal activities surrounding the caviar trade in much of the range (Anon., 2000b; Dobbs, 1992; Doward, 2000; Evtouchenko, 1997; King, 1998; Ward, 2000a; 2000b).

Azerbaijan: The Vavarin reservoir on the Kura River prevents sturgeon from accessing spawning grounds. Lakes of deposited oil occur in industrial regions; the number of these is expected to increase with the rising sea level (Dumont, 1995). The waters of this country are particularly important winter feeding grounds. Along the northern and southern coast of Azerbaijan, within the 200-nautical mile Exclusive Economic Zone, *H. huso* is caught as by-catch in stationary nets and *kilka* (Clupeidae) fishing devices. Young and adult fish are caught by coastal fisheries during migration. Juvenile fish comprise up to 17.7% of the by-catch (CITES Management Authority of Azerbaijan, *in litt.* to TRAFFIC Europe, 18 September 2000).

Species composition of the total catch in the 1990s

	<i>A. persicus</i> & <i>A. gueldenstaedtii</i>	<i>A. stellatus</i>	<i>Huso huso</i>	<i>A. nudiiventris</i>
Catch	63.47%	30.77%		5.76%
By-catch	78.50%	16.80%	3.70%	1%

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

Adult *H. huso* are caught in spring and autumn. This fishery is carried out in low salinity waters.

Annual recorded landings of *H. huso* (tonnes)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<i>H. huso</i>	27.0	21.0	49.00	74.60	33.30	29.50	24.10	22.30	13.1	20.00
	0	0							0	
Total	74.0	88.2	111.0	240.1	201.2	162.5	120.3	128.6	82.4	108.9
	0	0	0	0	0	0	0	0	0	0

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

Bulgaria: Wild sturgeon populations are threatened by a 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 to incidental catch of young migrating sturgeon. Water pollution has also influenced the metabolism of fish (CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000).

The largest part of the Bulgarian sturgeon catch is composed of *H. huso*. This share has decreased progressively from 92% in 1995 to 73% in 1999.

Annual sturgeon catch in Bulgaria (tonnes)

	1995	1996	1997	1998	1999
<i>H. huso</i>	13.6	28.8	42.2	43.5	37.0
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 caviar production of Bulgaria. The entire sturgeon meat production is consumed within Bulgaria.

Georgia: During the fishing seasons, particularly coastal anchovy fisheries, numerous sturgeon juveniles are caught as by-catch. The estimated number of sturgeon caught (no species specific data available) declined from 77,000 individuals in 1977, to 57,000 in 1980 and to 27,000 in 1986. During the 1990s, illegal fishing in Georgia expanded rapidly as a result of poor control (Zarkua and Tsuladze, 1999).

Iran: For the past 5 years, the Iranian domestic market of caviar and sturgeon meat is estimated at 5% and 65% of the country's total production, respectively (CITES Management Authority of Iran, *in litt.* to TRAFFIC Europe, 24 September 2000).

Annual catch of *H. huso* (tonnes)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>H. huso</i>	257.4	249.4	198.4	137.8	140.1	137.6	167.1	135.4	139.6	117.6	14.1
Total	2,296.3	2,315.1	2,058.0	1,462.1	1,380.9	1,216.3	1,310.0	1,043.5	1,127.9	923.3	182.4

* Catch in spring 2000 only.

Source: CITES Management Authority of Iran, *in litt.* to TRAFFIC Europe, 24 September 2000

The annual production of *H. huso* meat and caviar in Iran has decreased significantly (Dr M. Pourkazemi, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Sturgeon meat and caviar production for *H. huso* in 1992 and 1999 (tonnes)

	1992				1999			
	Meat	% *	Caviar	% *	Meat	% *	Caviar	% *
<i>H. huso</i>	162.0	10.1	6.2	2.4	96.0	13.1	4.2	4.2
Total	1,604.2		262.3		730.2		99.3	

* Percentages relate to the share of *H. huso* products of the total Iranian sturgeon fisheries.
 Source: Dr M. Pourkazemi, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000

The above tables indicate that the total tonnage of meat and caviar of *H. huso* produced in Iran comprised 85% of the country's annual catch in weight in 1992 and 1999.

Kazakhstan: Oil fields are developing rapidly in the northern Caspian Sea, especially the Tengiz oil field in Kazakhstan (Sagers, 1994). Pollution from this industry affects spawning and feeding grounds. Radioactive contamination from a nuclear reactor also poses a threat (Dumont, 1995).

Annual catch of *H. huso* (tonnes)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>H. huso</i>	330.0	288.0	280.0	389.0	209.0	321.5	124.6	95.3	80.0	53.0	54.7
Total	1,963.0	1,767.0	1,437.3	1,109.0	556.0	573.0	367.8	389.5	490.0	279.0	230.5

* Spring catch.

Source: CITES Management Authority of Kazakhstan, *in litt.* to TRAFFIC Europe, 21 September 2000

Moldova: Poaching is the main threat (Vedrashko *et al.*, 1998).

Romania: The Danube River population is threatened by the Djerdap I and II dams which prevent access to spawning grounds. This population is also under threat by other anthropogenic factors which have caused dramatic environmental changes in the Black Sea and the Danube River (Bacalbasa-Dobrovici, 1997).

Annual catch of *H. huso*, including the Danube River, Danube Delta and the Black Sea (kilograms)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
	2,017	1,138	810	6,787	7,051	10,724	19,903	7,736	5,701

Source: Dr N. Patriche, *in litt.* to IUCN/SSC Wildlife Trade Programme, 5 September 2000

Scientific surveys concluded that the population of *A. stellatus* is quite well represented in Danube River. From 1991 to 1999, about 51% of the total Romanian sturgeon catch in the Danube River were composed of *H. huso*.

Russian Federation: The construction of the Volgograd Dam decreased the range area and spawning ground to only 12% of the former area available in the Volga River. Similarly, available spawning grounds in the Terek and Sulak rivers have been reduced to 132 ha and 202 ha respectively. Flow regulation of the Kuban River has caused the loss of approximately 140,000 ha of breeding ground and the Tsymlyansk Reservoir construction on the Don River in 1952 has removed approximately 68,000 ha of spawning ground (Volovik *et al.*, 1993).

The current spawning population consists mainly of fish that hatched after the alteration of the Volga River flow. Fish growth here appears to be retarded and the weight has almost halved in the 20 years from the early 1970s to the early 1990s (Khodoresvskaya *et al.*, 1993). Pollution has caused anomalies and may have rendered 100% of *A. stellatus* larvae in the Volga River non-viable (Shagaeva *et al.*, 1993). This effect may also be applicable to *H. huso*.

Catch of *H. huso* in the Caspian Sea (tonnes)

	1992	1993	1994	1995	1996	1997
Catch	746	247	157	94	109	86

Source: Caspian Fisheries Research Institute (KaspNIRKh), cited in Anon., 2000b

From 1992 to 1997, about 50% of the Russian catches of sturgeon in the Caspian Sea was composed of *H. huso* (Anon., 2000b).

The domestic consumption of sturgeon products in the Russian Federation is unknown, but is said to be the main form of consumption of illegal sturgeon fisheries (Mr Roman 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 was evaluated to be 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).

Turkey: The Yesilirmak River changed dramatically due to the construction of two dams in 1979, the lowest of which limits upstream migration. The Kizilirmak was dammed in 1998 and is heavily polluted. Habitat loss was predicted due to canalisation, and the spawning ground area has been drastically reduced. From 1969 to 1979, the Turkish annual sturgeon landings ranged from 310 t to 10 t, with an annual average of 112 t (Edwards and Doroshov, 1989). In Samsun, a Turkish landing site on the Black Sea, a caviar processor claimed in 1989 that his business had decreased from 8 t/year of caviar between the 1940s and the 1970s to 0.2 t/year at the end of the 1980s. In 1989, sturgeon were caught as by-catch by illegally operating trawlers along the Turkish coast at a distance greater than 3 nautical miles from the shore, but also illegally within the 3 nautical mile limit. This represented the main fishing pressure on sturgeon. In April 1989, *A. stellatus*, *A. gueldenstaedtii*, *A. sturio* and *H. huso* were observed in Samsun. The investigators were told that *A. nudiventris* was also landed in Samsun (Edwards and Doroshov, 1989).

Ukraine: The population is threatened by pollution in the Dniester River. Catch of *H. huso* in Ukrainian waters is prohibited since the species was listed in the Red Data Book of Ukraine in 1992 (Anon., 2000c).

Yugoslavia: The Danube River spawning grounds are no longer accessible due to the construction of the Djerdap dams. The catch of *H. huso* in the region of Djerdap, on both the Yugoslav and Romanian sides of the Danube River, dropped from 8,596 kg in 1989 to 3,994 kg in 1994 (Jankovic, 1999). Sturgeon fishing is now limited to 17.8 km of fishing ground from the Djerdap II dam to the border, close to the Timok River mouth (Anon., 2000c) (see "Conservation Measures").

INTERNATIONAL TRADE

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

Gross exports of *H. huso* are given in the Appendix. According to 1998 CITES data, gross exports of *H. huso* caviar (Beluga) from range States totalled 21.3 t. The main exporters were Russia (8 t), Kazakhstan (7 t), Bulgaria (1.7 t) and Iran (1.3 t). The main importers of Beluga caviar in 1998 were: Switzerland (9 t), USA (8.5 t), France (4 t) and Germany (3.5 t).

In 1998, Iran also exported a variety of other Beluga products: 15.8 t of meat and 22 skins (probably processed into leather). Most of the meat was imported into European countries (Italy, Switzerland and France in decreasing order of importance). In 1999, Iran's exports included meat of wild origin for a total of 49.6 t. However, not all Annual Reports for 1999 have been submitted and hence this figure may under-reflect the actual volume of its trade in meat. Other *H. huso* products exported from Iran in 1999 included 30 kg of swim bladders imported by Germany to be processed into isinglass (fish glue used to clarify beer, wine and champagne, and for use in antique restoration). Iran did not report exports of any sturgeon specimens in its 1999 Annual Report.

Exports of *H. huso* from Russia in 1999

	Quantity (kg)	Description	Importer	No of permits
<i>H. huso</i>	5,738.27	Caviar	US, DK, BE, FR, DE, CH	11 Ex. + 7Re-ex.
	617.00	Meat	US	2 Export
Hybrids:				
<i>H. huso x A. ruthenus</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

Exports of *H. huso* caviar from Bulgaria in 1998 and 1999 (kilograms)

	1998	1999	Jan.-Sept. 2000
Caviar of <i>H. huso</i>	1,392	2,213	901

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

Exports quotas for *H. huso* and its hybrids (kilograms)

	1998		1999		2000		
	Caviar	Meat	Caviar	Meat	Caviar	Meat	Fert. Eggs
Azerbaijan			434	13,000	700	7,000	
Bulgaria	2,500		2,400		2,500		
Iran	5,000		3,000		3,000		
Kazakhstan			6,000		3,600	56,000	
Romania			1,750	2,500	3,200	35,000	
Russian Federation	5,000		3,000		3,500	13,000	10
<i>H. huso</i> x <i>A. ruthenus</i>							90
Turkmenistan					700		
Annual total	12,900	0	16,584	15,500	17,200	111,000	100

Source: CITES Notification No.s 1998/35-36-61, 1999/21-47-53-68 and 2000/053-056

Illegal trade: In 1998, confiscated caviar shipments of unknown origin totalling 87 kg have been reported by USA upon import. This was composed of 18 kg re-exported by Turkey and 69 kg re-exported by the United Arab Emirates. Discrepancies between trade statistics of countries importing and exporting caviar can indicate illegal activities. Such discrepancies were found in 1995 and 1996 for instance for Turkey (customs declared caviar exports 21 t and 80 t respectively) and European Union Member States (6 t and 20 t respectively) (Raymakers, 1999). Additionally, Turkish 1996 caviar exports totalled 121 t (Raymakers, 1999), while the country's sturgeon fisheries has been limited to only few incidental catches since the late 1980s (Edwards and Doroshov, 1989).

Poaching and smuggling are closely related and have been intensively reported in the media of both range States and importing countries (Evtouchenko, 1997; McDonald, 2000; Snyder, 2000). However, much of the illegally caught sturgeon is destined to the domestic market, particularly meat (Anon., 1998).

CONSERVATION MEASURES

H. huso is not fully protected in any range State, with the exception of Moldova. However, a license is required for fishing in most of the range States and in Iran private sturgeon fisheries are prohibited. In 1996, an agreement between countries bordering the Caspian Sea prohibited fishing in the open sea. Fish lifts and artificial spawning grounds have been introduced in some Caspian regions.

Azerbaijan: The Intergovernmental Commission for Caspian Biological Resources, composed of representatives of all range States, sets annual catch quotas (CITES Management Authority of Azerbaijan, *in litt.* to TRAFFIC Europe, 18 September 2000).

Catch quotas for *H. huso* allocated to Azerbaijan (tonnes)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>H. huso</i>	10	122	122								10.85
Total	200	308	510	480	360	182	160.5	160.5	160.5	108.67	108.35

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

The restocking programme initiated in the 1960s by the former Soviet Union has been particularly important for *H. huso*. Three hatcheries were built in the lower Kura River. Two million *H. huso* fry were released annually in the Kura River from 1967 to 1980. A feasibility study of the World Bank reports that the total capacity of the hatcheries was originally 12 million, but that this capacity had dropped significantly over the years (T. Turner, *in litt.* to TRAFFIC Europe, 6 October 2000). World Bank funds have been allocated for the construction of a new sturgeon hatchery and farm that will have the capacity to produce 15 million fry per annum. This should be operational in the next couple of years, late 2002. However, the major concern for *H. huso* is the availability of adult fish to constitute the broodstock of the farm.

Number of sturgeon fry released into the lower Kura River (million fingerlings)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>H. huso</i>	0.406	0.144	0.450	0	0	0	0	0.072	0	0.162	0.357
Total	17.523	9.082	2.980	1.838	1.142	1.242	4.070	6.065	6.220	20.290	16.965

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

In Azerbaijan, the State institution responsible for sturgeon fishery and processing matters is the "State Concern Azerbalyg". Commercial sturgeon fisheries are prohibited in the open sea. No fishing licenses were required before 2000. The only fishing gear permitted for sturgeon catch in the Kura River is "sweep nets" of 35-55 mm mesh size. The minimum size limit set for *H. huso* catch is 165 cm in the Kura River, and 180 cm in coastal waters (Anon., 2000c).

Bulgaria: Measures at national level as described hereunder are needed, but they must be linked to co-ordinated actions of all countries in the Black Sea region. In Bulgaria, sturgeon fisheries are prohibited for 30 days, from 20 April to 20 May each year, at the peak of the breeding season. The authorities may approve a 15-day extension of the closed season pending the natural conditions of the year. Explosives, poison, bottom trawling and dragging, as well as stunning substances and devices are prohibited fishing methods. The minimum size limit for *H. huso* is 140 cm. Export quotas are set on the basis of catch data, trends and the biological characteristics of the species. A restocking programme exists and is controlled by the relevant government agencies. A system has been established for the distribution of export quotas among export companies that are obliged to restock the Danube River with sturgeon fry before they are authorised to export sturgeon specimens (CITES Management Authority of Bulgaria, *in litt.* to TRAFFIC Europe, 15 September 2000). For example, for a given year, for each kilogramme of caviar exported, the company must release 30 juvenile sturgeon (Anon., 2000c).

Number of *H. huso* released through the restocking programme (number of fish)

	1998	Size	1999	Size	2000	Size
<i>H. huso</i>	200	20 g each	2,700	60 g each	750	550 g each

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

Due to budgetary constraints, Bulgaria has not recently monitored the wild sturgeon population, nor the success of its restocking programme (e.g. through tagging of released fingerlings). However, plans have been prepared for these activities. A special prohibition was adopted on the use of "unbaited hooks" for sturgeon catch (Anon., 2000c).

Iran: Biometric measurements are carried out for each species at all sturgeon catch stations. The age, length, sex and weight of fish landed are recorded. The population structure is estimated on the basis of age groups. As a result of these studies carried out for the past 10 years, the number of catch stations were decreased by 50%, changes were adopted on sturgeon catch methods and lower export quotas were set for the past five years. Export quotas are established on the basis of results of research programmes and annual monitoring of stocks. These activities include the following parameters and activities: Maximum Sustainable Yield and total catch, rehabilitation of stocks, management and sustainable exploitation through restricting illegal catch and overfishing. Monitoring fishing efforts and regulating the time of catch are also carried out on the basis of research results (CITES Management Authority of Iran, *in litt.* to TRAFFIC Europe, 24 September 2000).

Annual release of sturgeon fry in the 1990s (million fingerlings)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
H. huso	0.14	0.17	0.45	0.30	0.49	0.29	0.34	1.44	0.69	0.41
Total	4.56	6.60	3.45	4.17	5.91	9.13	12.35	21.63	24.56	19.10

Source: CITES Management Authority of Iran, *in litt.* to TRAFFIC Europe, 24 September 2000

A labelling system is in place, where each tin of caviar holds a sign or mark that indicates at least the date and place of catch, the name of the catch station, name of processor and the species.

Considering the biological and commercial importance of this species, catch of *H. huso* has been banned in some of the provinces for more than five years. Additional conservation measures have been taken for all sturgeon species in the southern shores of the Caspian Sea; banning the use of gillnets in the Caspian Sea has been effective in conserving the stocks of *H. huso* (Dr M. Pourkazemi, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Kazakhstan: Commercial sturgeon catch is only allowed in the tributaries of the Caspian Sea. However, scientific catch is permitted in the open sea with an annual quota of 20 t (Anon., 2000c).

Sturgeon fisheries are regulated by law. There are two fishing seasons, one during spring spawning and the other during winter migration. The exact dates of the fishing seasons vary with the climate and are therefore set annually by the authorised scientific research organisations. As in most former Soviet Republics, the only legal fishing gear for sturgeon are "sweep nets" (bottom nets that are hauled several times a day) with a minimum mesh size and each being marked with the name and address of the owner. Each fisherman can only set one net at the time. A fishing license is required. Sturgeon fishing grounds ("tonia") are limited: there are twelve on the Ural River and eight on the Kigach River. The minimum size limit for *H. huso* is 180 cm. The ratio of males and females caught is not regulated. The purchase price at the landing site is based on a fixed legal rate of caviar weight extracted per female; *H. huso* is set at 19.4% of the total body weight.

Annual commercial catch quotas are allocated to Kazakhstan by the Intergovernmental Commission for Caspian Biological Resources which meets annually in Astrakhan.

Annual catch quotas for Kazakhstan (tonnes)

	1996	1997	1998	1999	2000
H. huso			80	60	58.5
Total	375	480	460	405	371

Source: CITES Management Authority of Kazakhstan, *in litt.* to TRAFFIC Europe, 21 Sept. 2000

Two hatcheries, Uralo-Atyrau and Atyrau, have been operational since 1998.

Annual release of *H. huso* fry (number of fingerlings)

	1998	1999	2000
H. huso		515,666	192,000
Total	1,706,193	5,318,471	5,507,160

Source: CITES Management Authority, *in litt.* to TRAFFIC Europe, 21 September 2000

Moldova: *H. huso* fishery is prohibited by law (Anon., 1999).

Romania: The type of sturgeon fishing gear is strictly regulated by Romanian law. The fishing season is set each year by Ministerial Order. A fishing license is required to catch sturgeon in Romanian waters. The minimum size limit for *H. huso* is 170 cm. Catch quotas are calculated by independent scientific institutes, such as the Danube Delta Institute in Tulcea and the "Centre for Conservation, Fish Farming, Fishing and Fish Industrialisation" in Galati. The 1998 and 1999 catch quotas for *H. huso* were set at 17.5 t/year. The Romanian restocking programme has not released juvenile Beluga in the Danube River (Anon., 2000c).

Russian Federation: For Caspian Sea populations, the former Soviet Republics set annual catch quotas in agreement with Iran. Sturgeon catch quotas have been established by the Intergovernmental Commission for Caspian Biological Resources for many years. Since 1993, the annual share of sturgeon catches of each former USSR Caspian range State are as follows: the Russian Federation 70%, Kazakhstan 17.6%, Azerbaijan 6.1% and Turkmenistan 6.3%. There are two fishing seasons in the Caspian Sea waters: from ice melting to 5 June, and from 1 September until the time of ice formation. A license is required to catch sturgeon in Russian waters. The minimum size limit for *H. huso* caught in Caspian Russian waters is 180 cm along the coast, and 165 cm in the northern Caspian Sea. Russian catch quotas are declared by the Federal Government following recommendations given by the State Fisheries Committee in consensus with an independent council of experts (Anon., 2000b).

Release of *H. huso* in the Volga River and the Sea of Azov by Russian hatcheries (number of fish)

	1979-1980	1981-1985	1986-1990	1991-1995	1996-1998
Volga River	15,000,000	18,300,000	13,000,000	8,500,000	12,000,000
Sea of Azov	2,000,000	222,800	377,000	27,200	404,218

Source: Azov and Caspian Fisheries Research Institute (Az- and KaspNIRKh), cited in Anon., 2000b

From 1979 to 1998, *H. huso* comprised approximately 21.2% and 4.2% of all fry released by Russian hatcheries into the Volga River and the Sea of Azov respectively (Anon., 2000b).

Turkey: In 1979, with the exception of *H. huso* of more than 140 cm long, the fishery for sturgeon was prohibited in Turkish waters (Edwards and Doroshov, 1989). Circular 34/1, effective from 2000-2002, prohibits the collection of Acipenseriformes (CITES Management Authority of Turkey, *in litt.* to TRAFFIC Europe, 20 September 2000).

Turkmenistan: In the country's coastal waters, sturgeon fishery is allowed for scientific research only, with an annual catch limit of 20 t. The Turkmenistan State Committee of Fisheries issues an annual license for sturgeon commercial catches to the State enterprise, Balkanbalyk. No other company, Turkmen or otherwise is permitted to commercially fish sturgeon in Turkmen inland waters. An annual catch quota for the species in Turkmenistan is set by the Intergovernmental Commission for Caspian Biological Resources. There is no sex ratio set for sturgeon landings. Information on the minimum size limit per species and data on the annual catch quotas set for Turkmenistan were not provided (Anon., 2000c).

Ukraine: Catch of *H. huso* in Ukrainian waters is prohibited since the species was listed in the Red Data Book of Ukraine in 1992 (Anon., 2000c).

Yugoslavia: The closed fishing season set for *H. huso*, *A. gueldenstaedtii* and *A. stellatus* is from 15 May to 15 June. An agreement was signed between Romania and Yugoslavia on the prohibition of fishing gear causing high mortality of untargeted fish. Any fishing activity, including all commercial and sport fisheries, requires a license in Yugoslav waters. The licenses are issued on a per district basis and the sturgeon fishing grounds are limited to 17.8 km downstream of the Djerdap II dam and the mouth of the Timok River. The minimum size limit for *H. huso* is 140 cm and the annual catch quota for the species from 1996 to 2000 was set at 4,500 kg per year. A restocking programme is being carried out by the Centre for fish reproduction of the "Djerdap Fishing Company" in Malla Vrbica village. Data on the release of juvenile sturgeon have not been provided (Anon., 2000c)

CAPTIVE BREEDING

The reduction in the area of natural spawning grounds due to river flow regulation has caused population declines. Fish reared in hatcheries have therefore been produced to maintain the stock. In the former Soviet Union *H. huso* has been bred in captivity since the 1960s in order to maintain the spawning stocks for commercial harvests of the Sea of Azov, the Caspian and Black seas. An average of 0.8 million fry were released annually into the southern Caspian Sea at the end of the 1980s. Most hatcheries of Azerbaijan, Kazakhstan and the Russian Federation, ceased operation in the early to mid-1990s following shortage of government funds (De Meulenaer and Raymakers, 1996).

Azerbaijan: Three hatcheries were built in the 1960s and have contributed to the former Soviet Union sturgeon restocking programme ever since. Their combined annual productive capacity was 12 million fry, but this has dropped significantly due to rising levels of the Caspian Sea and the lack of funds allocated to hatchery maintenance (T. Turner, World Bank consultant, *in litt.* to TRAFFIC Europe, 6 October 2000).

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 and the farm is currently stocked with 3.5 year old *H. huso* and *A. gueldenstaedtii* that weigh 11-14 kg each. 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).

Georgia: Until the early 1990s, artificial breeding of sturgeon species was carried out at the Varistkhi Sturgeon Plant. Built in 1983 and located on the Rioni River, the results were not always considered satisfactory (Zarkua and Tsuladze, 1999).

Hungary: There are no captive breeding facilities for *H. huso* (CITES Management Authority of Hungary, *in litt.* to TRAFFIC Europe, 13 September 2000).

Iran: Five hatcheries are in operation in Iran (De Meulenaer and Raymakers, 1996). In the mid-1990s, more than five million *H. huso* fingerlings weighing 3-5 g were released into the Caspian Sea by Iran. In 2000, more than 1.5 million *H. huso* weighing 30-50 g were released into the Caspian Sea (Dr M. Pourkazemi, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000). In Iran, this species has been reared in captivity for more than ten years. Apart from the governmental sector, the non-governmental sector has also invested in the captive breeding of this species. At present, more than 30,000 *H. huso* individuals between one and ten years of age have been introduced into rearing ponds. Iran intends to culture 1,000 t of *H. huso* for meat and caviar production (Dr M. Pourkazemi, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Kazakhstan: There are two hatcheries in Kazakhstan, the Uralo-Atyrau and the Atyyrau. These have been operational since 1998 (CITES Management Authority of Kazakhstan, *in litt.* to TRAFFIC Europe, September 2000).

Russian Federation: In the mid-1990s, it was estimated that approximately 91% of the Caspian Sea stock of *H. huso* originated from hatcheries (Barannikova, 1995), whilst in 1993, 100% of each generation of *H. huso* in the Sea of Azov derived from captive-bred released fry (Volovik *et al.*, 1993). However, high levels of poaching have reduced natural populations to such low levels that most hatcheries have not been able to catch enough mature fish to produce fry for the restocking programme (Artyukhin, 1997). A hatchery on the Kuban River (Russian Federation) was still operating in 1997 (Chebanov and Savelyeva, 1999). 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).

United States of America: Sturgeon species are in preliminary stage of captive breeding in Hawaii (CITES Management Authority of USA, *in litt.* to TRAFFIC Europe, September 2000).

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Gross exports of, and export quotas for *Huso huso* 1998

TAXON	TERM	UNI	Export	1998	Export Quotas 1998
		T	er		
<i>Huso huso</i>	bodies		PG	8	
<i>Huso huso</i>	bodies #	kg	IR	12,750	
<i>Huso huso</i>	eggs		AE	267	
<i>Huso huso</i>	eggs		DE	88	
<i>Huso huso</i>	eggs		FR	350	
<i>Huso huso</i>	eggs		NL	16	
<i>Huso huso</i>	eggs		RO	90	
<i>Huso huso</i>	eggs		SG	1	
<i>Huso huso</i>	eggs		TR	69	
<i>Huso huso</i>	eggs		US	2	
<i>Huso huso</i>	eggs	kg	AE	3,001	
<i>Huso huso</i>	eggs	kg	AZ	114	
<i>Huso huso</i>	eggs	kg	BE	28	
<i>Huso huso</i>	eggs	kg	BG	1,717	2,500
<i>Huso huso</i>	eggs	kg	CH	6,467	
<i>Huso huso</i>	eggs	kg	CZ	8	
<i>Huso huso</i>	eggs	kg	DE	1,281	
<i>Huso huso</i>	eggs	kg	DK	226	
<i>Huso huso</i>	eggs	kg	ES	0	
<i>Huso huso</i>	eggs	kg	FI	183	
<i>Huso huso</i>	eggs	kg	FR	789	
<i>Huso huso</i>	eggs	kg	GB	18	
<i>Huso huso</i>	eggs	kg	HK	32	
<i>Huso huso</i>	eggs	kg	IR	4,013	5,000
<i>Huso huso</i>	eggs	kg	KZ	7,033	
<i>Huso huso</i>	eggs	kg	NL	1,418	
<i>Huso huso</i>	eggs	kg	PL	4,365	
<i>Huso huso</i>	eggs	kg	RO	303	
<i>Huso huso</i>	eggs	kg	RU	8,035	5,000 (including AZ & KZ)
<i>Huso huso</i>	eggs	kg	SG	8	
<i>Huso huso</i>	eggs	kg	TR	1,075	
<i>Huso huso</i>	eggs	kg	UA	52	
<i>Huso huso</i>	eggs	kg	US	150	
<i>Huso huso</i>	meat	kg	IR	3,005	
<i>Huso huso</i>	meat	kg	US	18	
<i>Huso huso</i>	skins		CH	22	
<i>Huso huso</i>	skins		IR	22	
<i>Huso huso</i>	specimens		DE	0	

The term "bodies" should be interpreted as "meat" (Dr P. Bronzi, *in litt.* to IUCN/SSC Wildlife Trade Programme, 8 September 2000).

* **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).