PROPOSAL FOR INCLUSION OF SPECIES ON THE APPENDICES OF THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

A. PROPOSAL: Inclusion of the following species of *Huso huso* in **Appendix II** of the Convention on the Conservation of Migratory Species of Wild Animals (CMS):

B. PROPONENT: **Federal Republic of Germany**

C. SUPPORTING STATEMENT

1. Taxon

1.1	Classis:	Actinopterygii	
1.2	Ordo:	Acipenseriformes	
1.3	Familia:	Acipenseridae	
1.4	Species:	*Huso huso* Linnaeus, 1758	
1.5	Common names	Bulgarian:	Moruna
		Croat:	Moruna
		Czech:	Vyza, Vyza velka
		English:	Giant sturgeon, Great sturgeon, Beluga, European sturgeon
		French:	Beluga
		Finnish:	Kitasampi
		German:	Hausen
		Greek:	Akipíssios, Mocuna
		Hungarian:	Viza
		Icelandic:	Mjaldur
		Italian:	Storione ladano, Storione attilo
		Polish:	Bieluga z. wyz
		Portuguese:	Esturjâo do Cáspio
		Russian:	Beluga
		Romanian:	Morun
		Serbo-Croat:	Moruna
		Slovak:	Vyza vel´ká
		Spanish:	Beluga, Esturión gigante
		Turkish:	Mersin morinasi, Mersinmorinasi (baligi)
		Name of caviar:	beluga

2. Biological data

2.1 Distribution

Huso huso inhabits the Caspian Sea, the Black Sea and the Sea of Azov as well as the large rivers which enter these basins (Pirogovskii et al., 1989; Birstein 1993). Historically, the species also occurred in the Adriatic Sea, but is believed to be extinct in this basin.

The species is anadromous (definition see on p. 12: 2.4) and migrates into the large rivers that flow into these seas for spawning:

In the Caspian Sea, the main spawning river is the Volga, but the species is also

encountered in the Ural River (Kazakhstan) and probably in the Kura River (Azerbaijan). It was also reported from the Sefid-Rud and Gorgan Rivers on the southern coast of the Caspian Sea (Iran) (Pirogovskii et al., 1989). However, the species currently does not enter the Sefid-Rud because the spawning grounds in this river have been destroyed by the construction of the Mangil Dam and the heavy pollution (J. Holcik – personal communication).

A few individuals of *Huso huso* still enter the rivers along the Black Sea coast bordering the Caucasus, including the Rioni River (Elanidze, 1983 in Pirogovskii et al., 1989). The only current record of a spawning population of the species in the Black Sea basin is in the Danube River.

In the Sea of Azov, there is no recent record of the species.

In the Adriatic Sea, historically only solitary individuals have been reported from the northern part of Venice and the lower sections of the Po River (Fischer et al., 1987; Pirogovskii et al., 1989). Since 1972, there were no reports of *Huso huso* in the Po River basin (Rossi et al., 1991).

2.2 Population

There is no information about the total size of the population.

The largest population of *Huso huso* is believed to live in the Volga-Caspian region which produces about 80 percent of the total sturgeon catches (Vlasenko, 1990). Levin (1997) estimated that the spawning population that entered the Volga River in recent years constituted of about 8,000-9,000 mature individuals, with females accounting only for 20-24%. The method of census for this estimate is not provided. There are virtually no estimates of spawning populations in the other rivers that enter the Caspian Sea, but all experts (Vlasenko, 1990; Khodorevskaya and Novikova, 1995; Levin, 1997) believe them to be minimal.

There are no recent estimates about the total size of the populations inhabiting the Black and Azov Seas basins. Volovik et al. (1993) estimated that the total stock biomass of all sturgeons living in the Sea of Azov was about 59,000 metric tons in the mid 1980s, with *Huso huso* accounting for 3% of the total sturgeon biomass (1,770 metric tons). However, in 1990, a mass death of sturgeon occurred in this watersheds and approximately 55,000 sturgeon individuals were found dead on the shore. Ever since, no estimation of the population size has been made.

In the Danube River, the beluga is now extirpated in the upper part of the river and critically endangered in the middle part because of damming (Hensel and Holcik, 1997). The only current record of the beluga in the Black Sea basin is the lower stretch of the Danube river from the mouth up to the Iron Gate Dam (Jankovic, 1995).

The IUCN (1996) classifies the status of the different populations of *Huso huso* as follows:

- the population in the Sea of Azov is Critically Endangered,
- the Black Sea population (Russia, Ukraine, Romania, Hungary and Serbia) is Endangered,
- the Caspian Sea population (Russia, Azerbaijan, Kazakhstan, Turkmenistan and

Iran) is Endangered, and
_ the Adriatic Sea population (Italy) is Extinct.

The decline of the commercial catches of *Huso huso* reflect a decline in the size of the population. In Volga-Caspian region, where the species is most abundant, the catches declined from an average of 2,650 metric tons in the 1970s to 460 metric tons in the 1993 (Raspopov, 1993). Moreover, the data show that the fishery is presently wiping out the maturating fish (Raspopov 1990 and 1993). The most alarming fact was the decrease of natural reproduction of the species which already began with the construction of the Volgograd Dam but still worsened within the last years due to the high pollution level in almost all spawning rivers. Although *Huso huso* was subject to a large-scale ranching programme within the Russian Federation and probably also Iran, the stocks further declined. Barannikova (1995) estimates that about 91% of the beluga sturgeon catch within the Russian part of the Caspian Sea originated from farm-grown fish in 1993. In the Sea of Azov and Black Sea region, the situation is even worse: in 1993, 100% of beluga sturgeons within these watersheds came from hatchery-released juveniles (Barannikova et al., 1995) and the stocks are exclusively maintained by artificial propagation.

At present, the spawning population of the beluga sturgeon in the Volga River consists mainly of fish that hatched after the beginning of the river flow regulation (Khodorevskaya et al., 1997). The sex ratio and age structure of this population has changed drastically. The growth of the fish appears to be retarded because the size of the beluga spawners has decreased, e.g. from 1971 to 1973 the average weight of spawners was 110 kg, while from 1989 to 1992 it was only 63 kg (Khodorevskaya et al, 1995a). The number of females entering the Volga River decreased from 50% in 1980 to 17.6% in 1990.

Due to bad environmental conditions, the reproductive system of sturgeon females showed an increasing degeneration and several abnormalities in the gameto- and gonadogenesis occurred. Shagaeva et al. (1993) found that 100% of the eggs taken from *Acipenser stellatus* females caught in the lower Volga River in 1989 showed anomalies and 100% of the larvae (both from hatcheries and natural environment) were not viable. The same can be concluded for *Huso huso*. In the Sea of Azov and Black Sea, a mass death of sturgeons was observed in 1990, which was undoubtedly caused by disastrous environmental conditions. They may also have their effect on the remaining small population of *Huso huso*. Considering these evident signs of a sharp decrease in natural reproduction, several experts fear a further reduction of the population of *Huso huso* within its entire range. Levin (1995) states that artificial propagation techniques, although they contribute to a high amount to the maintaining of the stocks, cannot compensate for the damage caused to natural reproduction.

2.3 Habitat

During the period of life in marine waters, the great sturgeon mainly inhabits the pelagic zone (Pirogovskii et al., 1989). Its vertical distribution there depends on the presence of its food organisms, since larger beluga are predators and their prey are smaller fish. In the Black Sea region, the beluga are capable of descending as deep as 160 m and even deeper, where the presence of hydrogen sulfide can already be detected (Pirogovskii et al., 1989). In the Caspian Sea, the species is usually found between 100 and 140 m.

It has been noted that the great sturgeon is confined to regions of the sea with muddy bottoms (Pirogovskii et al., 1989). Apparently, the depth at which they remain does not

depend upon the size and age of the fish. Only during the first year of life, the juveniles remain in shallow warmed habitats (Pirogovskii et al., 1989).

2.4 Migrations

The beluga sturgeon is a migratory fish that travels considerable distances in the sea (feeding migration) and in the rivers where it reproduces (spawning migration) (Pirogovskii et al., 1989).

Huso huso is a typical anadromous species which means that mature adults migrate from the sea to the rivers for spawning and return to their feeding grounds in the sea after spawning. The juveniles which are hatching in the rivers also return to the sea for feeding and stay there until maturity.
The anadromous migrations of the species are very similar in all inhabited water systems. According to the time of the migration, there is a distinction between a spring race and a winter race (Berg, 1948). The spring race usually begins the spawning run into the rivers in early spring, in the mid or late summer the run reaches a peak and finally ceases in late autumn. The so-called winter race generally does not spawn the same year they enter the river. These fish hibernate in the rivers and reproduce the following year.

The juvenile sturgeons migrate downstream the rivers to feeding grounds in the sea. In the Caspian Sea the main feeding grounds are located in the northern part.

Within the Caspian Sea there is also a seasonal migration: in spring and summer most of the specimens are encountered in the northern part of the Sea on the main feeding grounds, while in autumn and winter a migration to the central and southern part of the sea has been observed (Barannikova et al., 1995).

In the Black Sea, the distribution of the beluga and its migration is determined by the locations of its prey, particularly anchovies (*Engraulis encrasicholus*), red mullet (*Mullus barbatus*), gobies (Gobiidae), shad (*Alosa* spp.) and flounder (*Platichthys flesus*). In the winter, the beluga sturgeon descend in search of prey to a depth of 160 m, but in the spring it returns to the upper layers where it remains during the warm season. A seasonal migration of the great sturgeon in the Black Sea occurs along the northern shelf (Pirogovskii et al., 1989).

3. Threat data

3.1 Direct threat of the population

The main threats to the species are the legal and illegal overfishing mainly during the spawning season, the loss of critical habitat such as spawning grounds due to dam constructions (see 3.2), and the high level of pollution in almost all rivers within its range.

The main threat to the survival of the beluga sturgeon is the legal and especially illegal overfishing stimulated by the high demand for black caviar on the international market. Beluga sturgeons are especially threatened by overfishing because the beluga caviar is a very highly priced product.

After the dissolution of the USSR in 1991, besides Russia and Iran three new states (Azerbaijan, Kazakhstan and Turkmenistan) and two autonomous Russian Republics (Dagestan and Kalmykia) started the harvest of sturgeons (Ivanov et al., 1995a). Until the end of 1998, there has been no agreement between these countries bordering the Caspian

Sea concerning a sustainable sturgeon fishery and adequate international fishing rules. Fishing in the open sea, which was completely prohibited by Soviet laws for a long period, was started mainly by Azerbaijan. As a consequence, mainly young and immature sturgeon were caught and the harvest in the open sea destroyed a major part of the future sturgeon stocks (Luk´yanenko et al., 1994). The situation with the legal catch was so critical that the Russian experts discussed the need to completely prohibit the legal commercial catch of sturgeons in the Caspian Sea for one to two years (Ivanov et al., 1995a).

The decline of the populations of *Huso huso* in the Caspian and Black Sea basins during the last years was mainly caused by the enormously high level of poaching (Artyukhin, 1997; Birstein, 1996; Zoltarev et al., 1996; Khodorevskaya et al., 1997). According to the opinion of experts, the size of the illegal catch is equal to or even higher than the legal catch. Poaching is common in almost all countries of the area: in Russia (with Dagestan and Kalmykia), Azerbaijan, Kazakhstan and even Iran. In the Volga River, during the last years practically all spawning fish have been caught by poachers before they could reach the spawning grounds below the Volgograd Dam (Artyukhin, 1997). The subsequent lack of mature fish even affected the work of the hatcheries during the last years since it was not possible to catch enough mature beluga sturgeon for artificial breeding (Artyukhin, 1997). The high level of poaching hence affects not only the natural reproduction of the species but also the artificial propagation, and therefore represents one of the main threats to the survival of *Huso huso*.

A further threat to the survival of *Huso huso* is represented by the high level of pollution in the Caspian and Black Sea basins. During the period from the beginning 1970s until the collapse of the Soviet Union in 1991, the level of pollution increased dramatically in almost all rivers entering the Caspian Sea, the main sources being oil and other industrial sewage (Vlasenko, 1990; Dumont, 1995; Khodorevskaya et al., 1997). In the Volga River, for example, the concentrations of heavy metals, mercury, phenols, surface-active agents, pesticides and oil products by far exceeded the maximum permissible concentration within this period (Romanov and Altuf´yev,1993). Considerable concentrations of these pollutants were also found in the northern part of the Caspian Sea (Romanov and Altuf´yev, 1993). Several authors (Altuf´yev et al., 1992; Romanov and Altuf´yev, 1991 and 1993; Romanov and Sheveleva, 1993; Kuz´mina et al. 1993; Altuf´yev, 1994; Shagaeva et al., 1993; Shagaeva et al., 1995) have investigated the influence of the very high level of pollution in the Caspian Sea and studied the effect of the various toxins on sturgeons. The studies revealed that environmental pollution caused considerable changes in hormonal balance, in the blood system, and in protein and carbohydrate metabolism, marked disturbances in the genesis of organs (liver, gonads) and tissues (skeletal muscles, heart) and the appearance of neoplasm in liver, gonads and sex cells. General weakening of the fish as a result of toxins, disturbed metabolism and hormonal imbalance led to a number of disturbances in sturgeon gonadogenesis , e.g. the increase in number of hermaphroditic specimens, ovotestis and tumours, and to the appearance of new differentiation such as striated muscle tissue and fascicles of dense connective tissue formations which are normally absent in healthy fishes. A tendency was noted toward an increase in the number of aberrations, especially in the gameto- and gonadogenesis (see also 3.3).

All these effects on sturgeons were clearly seen from 1986 until 1992 and were presumably caused by a release of toxic waste from one of the heavy industry plants located on the shores of the Volga River in the middle of the 1980s. Since the disintegration of the USSR in 1991, the production of the heavy industry drastically decreased which resulted in an improving water quality in the Volga-Caspian region.

Thus, in the early 1990s, the number of sturgeons with a pronounced muscle dystrophy disease dropped significantly.

However, there is a threat of increasing pollution in the whole Caspian Sea in the near future. The fast raise of the sea water level - from 1993 to 1997 it increased in 2,15m (Radionov, 1994) - will result in covering "lakes" of deposited wasted oil and associated pollutants from industrial sewage along the shore. Such "lakes" are already located in all industrial parts of Azerbaijan along the coast (Dumont, 1995) and their number will increase with the raising sea level. Sturgeons are especially threatened by the pollution in this region, because the waters of Azerbaijan represent important feeding grounds for the fish during the winter. A further near future threat for the northern part of the Caspian Sea is the fast development of oil fields, especially the Tengiz oil field, in Kazakhstan (Sagers, 1994). Sturgeons will be especially affected by pollutants from this developing industry because their main spawning and feeding grounds are located in the region of the northern Caspian Sea. Moreover, the central part of the Caspian Sea is threatened by radioactive contamination from the Gur´evskaya nuclear reactor near Akatai, Kazakhstan (Dumont, 1995).

In the Black-Azov Sea basin the situation of pollution is almost the same (Volovik et al., 1993). The Danubian and Dniester sturgeon populations are mainly threatened by the pollution of the rivers and the sea, and by the eutrophication of coastal waters which results in the appearance of temporary hypoxic areas on the Black Sea shelf. Chronic toxicosis with poisonous substances led to a mass death of fishes and in summer 1990 about 55,000 sturgeon individuals were found dead on the shore (Volovik et al., 1993).

Moreover, the introduction of the ctenophore *Mnemiopsis leydyi* into the Black Sea in the 1980s resulted in a destruction of the local pelagic food and thus affected the main feeding source of sturgeons (Dumont, 1995; Khodorevskaya et al., 1997).

3.2 Habitat destruction

The construction of hydroelectric power stations as well as of water reservoirs in almost all rivers where the species spawns led to a sharp reduction of available spawning grounds for *Huso huso*.

In the Caspian Sea basin, the beluga sturgeon lost approximately 90% of all spawning grounds (Barannikova et al., 1995; Khodorevskaya and Novikova, 1995; Khodorevskaya et al., 1997). In the main spawning river, the Volga, there remained only 430 ha of the total 3,600 ha after the damming of the river by the Volgograd Dam. The area of the natural spawning grounds in the Kura River has been reduced by dam constructions to about 160 ha, in the Terek River to 132 ha and in the Sulak River to 201.6 ha (Vlasenko, 1990), and thus lost their value as natural spawning sites for beluga sturgeon (Khodorevskaya and Novikova, 1995). The only unregulated river flowing into the Caspian Sea is the Ural which still provides an area of 1,400 ha for sturgeon spawning.

In the Black Sea and Sea of Azov, the situation is almost the same. Almost all rivers that enter these seas and are used by the anadromous sturgeons for spawning, have been blocked by dam constructions either of hydroelectric power stations or of irrigation systems. For example the regulation of the Kuban River flow resulted in the loss of approximately 140,000 ha of estuarine breeding grounds for all fluvial anadromous fish (Volovik et al., 1993). The construction of the Tsymlyansk reservoir on the Don River in 1952 resulted in an average loss of about 68,000 ha of spawning grounds for all fluvial anadromous fishes (Volovik et al., 1993). The Danube River has been blocked by the

construction of the insurmountable dams Djerdap I and II ("Iron Gate") which prevented all anadromous fish species from an upstream migration to the spawning grounds located above the first dam (Jankovic, 1995; Bacabalsa-Dobrivici, 1997).

The reduction of available natural spawning grounds due to river flow regulations subsequently led to a reduction of the natural reproduction and the stock of the species is maintained to a high extant by artificial propagation. In 1993, about 100% of each generation of *Huso huso* in the Sea of Azov consisted of farm-grown fish (Volovik et al., 1993), while in the Caspian Sea about 91% originates from hatcheries (Barannikova, 1995).

Hydroelectric power station dams not only cut off sturgeons from their main spawning sites, but also change the flow of the rivers, and consequently the opportunity of spawners to use the spawning grounds that are still left intact. Alterations of the Volga River flow as well as of other spawning rivers allow fewer beluga sturgeon to reach their spawning sites (Veshchev, 1995). The altered flow also affects the migration to the sea of juveniles either released from hatcheries or naturally hatched (Raspopov et al., 1995).

3.3 Indirect threat

The high pollution level in the Caspian and Black Sea basins (described in 3.1) also represents an indirect threat to the survival of the species because the breeding success is sharply reduced by environmental contaminants. Thus, at the beginning of the 1990s, an increased number of aberrations especially in the gameto- and gonadogenesis was noticed. In 1990, 100% of mature eggs taken from various sturgeon females showed various pathological anomalies suggesting the loss of viability. Moreover, in 1989 and 1990, a mass death of sturgeon larvae was observed caused by hatching aberrations and anomalous development such as defects in the fin fold and underdevelopment of the heart, both leading inevitably to death at early stages of development. In 1990, 100% of all investigated larvae (data for *Acipenser gueldenstaedtii* and *Acipenser stellatus*, but the same effects may be concluded for *Huso huso*) showed such anomalous development which was caused by environmental toxins. The anomalies in larval structure took place both in nature and in the hatchery.

During the last years, the water quality especially in the Volga-Caspian region has improved and some signs of degeneration disappeared. However, there is a threat of increasing pollution in the whole Caspian Sea basin in the near future with the sea level still raising and the oil industry especially in Kazakhstan and Azerbaijan developing.

3.4 Threat connected especially with migrations

The migration pattern of *Huso huso* (anadromous spawning migration and seasonal migration in the sea basins) makes the species especially vulnerable to overfishing because several national boundaries are cyclically passed and several range states are fishing for sturgeons in the Caspian and Black Sea basin. Only international agreements between the range states concerning the sturgeon fishery, a ban on the fishery in the open sea (protection for juveniles and immature fish) and a setting of sustainable quotas can help to stop the further decline of the species.

Especially in the Caspian Sea where the species is most abundant and the commercial exploitation is highest such an agreement between Azerbaijan, the Russian Federation, Kazakhstan, Turkmenistan and Iran is strongly needed. Although the international trade of all sturgeon products, especially of the highly priced caviar, is controlled by CITES

regulations since April 1998 and poaching is consequently hoped to cease, further action for the conservation of the sturgeon species is required.

Despite the fact that the five range states of the Caspian Sea has set up a *Committee for the Conservation and Use of the Biological Resources in the Caspian Sea* during the last years, the proposed international agreement governing Caspian sturgeon catch and drawn up by this Committee has not been signed so far (till the end of 1998).

3.5 National and international utilization

Huso huso is considered to be a valuable and delicious fish (Pirogovskii et al., 1989). The edible part averages 63% of the total weight of the fish. Its flesh is distinguished by a very high nutritional value. The dried swim bladders (isinglass) are used to produce a strong glue for use in mechanical devices. The most highly priced product of this species is the caviar made from its eggs and called "beluga".

Fishery. *Huso huso* is one of the three most important commercial species in the world and its catch occupies the third place among all catches of acipenserids (Tab. 3, appendix).

However, its national utilization is not easy to describe since official fisheries statistics do not distinguish between sturgeon species. The three commercially most important species are *Acipenser gueldenstaedtii*, *Acipenser stellatus* and *Huso huso* and account for 90% of all sturgeon catches in the world.

The major fishing area for *Huso huso*, as well as for the two other commercially important species, is the Caspian Sea where about 90% of the world sturgeon catches are landed. Within the Russian part of the Caspian Sea region, the Volga-Caspian region is the most important producing about 80.% of the total catch.

According to Khodorevskaya et al. (1997) *Huso huso* accounts for 5-7% of all sturgeon catches in the Volga-Caspian region.

FAO fisheries statistics (Tab. 2, appendix) show a drastical decline of the total landings of Acipenseridae within the last years. Before the disintegration of the former USSR only two states, the USSR and Iran, were fishing for sturgeons in the Caspian Sea. There was a quota system between both states and a complete ban on the fishery in open the sea.

In 1984, about 27,136 metric tons of sturgeons were landed world-wide, about 24,245 metric tons of which were caught in the USSR and 1,557 metric tons in Iran. In 1988, when the disintegration of the former USSR began, the world sturgeon catches had already declined to about 21,514 metric tons, with the Russian Federation accounting for 19,027 metric tons, Iran accounting for 1,851 metric tons. Since the collapse of the USSR in 1991, five states, i.e. the Russian Federation, Azerbaijan, Kazakhstan, Turkmenistan and Iran, and the two autonomous republics Dagestan and Kalmykia, are fishing for sturgeons in the Caspian Sea. Until the end of 1998, there were no fishing regulations, i.e. quota systems, between these states and republics and fishing in the open sea was no longer prohibited. Since 1988, the catches further declined to about 15,344 metric tons in 1991 (Russian Federation: 9,539 metric tons; Iran: 3,036 metric tons; Azerbaijan: 108 metric tons; Kazakhstan: 1,766 metric tons) and only 5,688 metric tons in 1996 (Russian Federation: 2,209 metric tons; Iran: 1,600 metric tons; Azerbaijan: 24 metric tons; Kazakhstan: 545 metric tons, Turkmenistan: 9 metric tons).

The above are the official figures. Unfortunately, the collapse of the USSR led to an expansion of illegal fishing which escapes any statistics. Furthermore, the FAO fisheries statistics do not distinguish between Russian inland waters, which means that the figures for the Russian Federation contain also a small amount of catches in the Siberian and Far Eastern water systems, estimated to be about 200 metric tons in 1993 (Barannikova et al., 1995) as well as an amount of catch in the Black Sea basin.

The catch statistics for *Huso huso* in the northern part of the Caspian Sea basin show a steady decline from 900 metric tons in 1991 to 153 metric tons in 1994 (Tab. 3, appendix).

The second fishing area of *Huso huso* is the Black-Azov Sea region where the sturgeon fishery is concentrated mainly in the north-western part near the Danube Delta (Romania) and in the Sea of Azov. According to FAO statistics, the annual sturgeon catches within this region were about 1,527 metric tons in the 1970s, with the USSR accounting for 1,434 metric tons, Bulgaria accounting for 12 metric tons and Romania for 81 metric tons. For Turkey, no sizeable commercial catch of sturgeons has been officially recorded. The sturgeon catches in the Black and Azov Seas decreased to a minimum record of about 585 metric tons in 1988 (Russian Federation: 520 metric tons, Bulgaria: 1 metric ton; Romania: 35 metric tons; new independent state of Ukraine: 29 metric tons) but raised again to 1,257 metric tons in 1994 (Russian Federation: 1,012 metric tons; Bulgaria: 10 metric tons; Romania: 8 metric tons; Ukraine: 227 metric tons). In 1996, the FAO-reported sturgeon catch in Bulgaria amounted 41 metric tons, while in Romania a total of 7 metric tons of sturgeons have been caught.

The declining catches of *Huso huso* as well as of the other sturgeon species reflect a drastical reduction of the population. The natural reproduction of the species is believed to be very low at present (Barannikova, 1995) and it is feared that virtually no natural reproduction of *Huso huso* occurs today. Since the disintegration of the former USSR in 1991 until the beginning of 1996, there were no fishing regulations between the range states in the Caspian Sea basin. Experts fear that the sturgeon stocks are overexploited and that the present unregulated harvest is far from sustainable use. Especially the fishing in the open sea endangers the survival of the species, because a growing number of immature specimens is caught and hence the potential spawning stock is further reduced.

While the flesh of the giant sturgeon is almost entirely produced for national trade, caviar is not only produced for domestic consumption but also for export.

Caviar. According to Josupeit (1994) the yields in caviar average between 2 and 17% of the total sturgeon catch, and up to 18 kg of "beluga" caviar can be harvested from one mature female giant sturgeon.

FAO statistics indicate that the global caviar production - like the world sturgeon catch - decreased drastically in the last decade, the statistics not distinguishing between caviar of the different sturgeon species. In the early 1980s, a total production of 2,500 metric tons of caviar has been officially recorded, and in 1992 about 1,500 metric tons have been legally produced world-wide (Josupeit, 1994). For 1996, experts estimated a total legal production of 122 metric tons of caviar world-wide, of which 190 metric tons originate from the Caspian Sea and 32 metric tons are coming from the Black-Azov Sea region, China, USA, Canada and Siberia (Tab.6, appendix).

The three major sturgeon species of which caviar is produced are *Acipenser gueldenstaedtii*, *Acipenser stellatus* and *Huso huso*, and account for 90% of the total caviar production. The major caviar producing countries are the Russian Federation and

Iran and 90% of the world production of caviar originates from the Caspian Sea. After the collapse of the USSR, the three independent states of Azerbaijan, Kazakhstan and probably also Turkmenistan, and the two autonomous republics of Dagestan and Kalmykia also started to produce caviar. In the Black and Azov Sea region, the newly independent state of Ukraine also produced caviar. According to FAO data (Josupeit, 1994) Iran experienced a steady increase of caviar production during the 1980s from about 200 to 300 metric tons, and almost all caviar produced in Iran (ca 95%) was exported (Josupeit, 1994). The main drop in the global production of caviar came from lower production in the Russian Federation. An important share of caviar used to stay in the former USSR, where about 85-90% of the production was consumed domestically and only 10% were exported (Josupeit, 1994; Taylor, 1997). The decline in disbursal income after the disintegration of the USSR led to a reduction of caviar consumption in all republics of the former USSR (Josupeit, 1994). As a consequence, almost all caviar produced in the CIS during the last years was exported.

The main importing countries of caviar are the EU with an average importation of about 200 metric tons per year (Tab. 12, appendix), while Japan imported on the average 60 metric tons (Tab. 10, appendix), the U.S.A. about 52 metric tons (Tab. 11, appendix) and Switzerland an estimated 66 tons caviar per year (data provided by the ´Bundesamt für Veterinärwesen´, Switzerland). However, some of the official import statistics (Japan and Switzerland) do not distinguish between roe from sturgeons and other fish species, a fact which causes a further problem to the estimation of the total volume of the caviar in trade.

Within the EU (Tab. 12, appendix), Germany is the main importer with an average of 81 metric tons per year, but a huge quantity is repackaged and re-exported into neighbouring countries. In 1994, the total import of caviar into Germany was 104.1 metric tons of which 27.3 metric tons were re-exported and 75.8 metric tons were consumed in the country. France is the second major importer with an average of 53 metric tons per year and is the major consumer of caviar within the EU. In 1994, France imported 47 metric tons of caviar (Tab. 12, appendix). Belgium/Luxembourg and the UK import an average of 23 metric tons of caviar per year; in 1994, Belgium/Luxembourg imported 28 metric tons and the UK imported only 6 metric tons (Tab. 12, appendix). The main suppliers of caviar to the EU are the Russian Federation, Iran, Kazakhstan and China.

Official Japanese import statistics (Tab 10, appendix) show a total annual import of caviar into Japan of 56 metric tons in 1994, the main suppliers being the Russian Federation (22 metric tons), Iran (25 metric tons) and China (7 metric tons). 2 metric tons of caviar are imported from other countries.

The US Marine Service statistics show a total import of 54.2 metric tons of caviar into the USA in 1994 (Tab. 11, appendix). The main suppliers of caviar to the USA are the Russian Federation, Canada, China, Kazakhstan, Sweden and Germany.

Switzerland imported in 1994 about 62 metric tons of caviar, the main suppliers being Iran, France, Germany, Sweden, Canada, Russia and Japan. Switzerland re-exported in 1994 about 13.5 metric tons of caviar, mainly to Saudi Arabia, France, USA and Australia.

According to Taylor (1997), the total Western World demand for caviar from Iran and the Russian Federation was about 450 metric tons in 1995 (Tab. 5, appendix), of which 3.5 metric tons were Iranian "beluga" and 0.2 metric tons were Russian "beluga". However, Taylor estimates that the total production of caviar from Iran and the former USSR in 1995 was only 228 metric tons, including 2 metric tons of Iranian "beluga" and

2 metric tons of Russian "sevruga". Hence, the Western World demand for caviar in general exceeded the actual total production by more than 100%. A general lack of beluga caviar on the international market has already caused replacements by other sturgeon caviar mislabelled as beluga (DeSalle and Birstein, 1996).

The world caviar market is currently undergoing a major crisis (Josupeit, 1994; TRAFFIC, 1995, Taylor, 1997; DeMeulenaer and Raymakers, 1997). Low quality caviar flooded the Western European markets in 1993 and 1994 (Taylor, 1997). This is mainly caused by over-exploitation, illegal production and smuggling of caviar, especially from the former Soviet Union. The sanitary conditions under which caviar is legally and illegally produced in this states are disastrous and as a result high amounts of processed caviar are only fit for disposal. Taylor (1995) estimated that for example in Azerbaijan although the raw material was of high quality, almost 80% of the processed caviar was only fit for disposal due to disastrous conditions during production, packaging and dispatch. As a result prices collapsed also for the high quality caviar still arriving from the Republics of the former USSR and from Iran (Josupeit, 1994).

The main importers expressed their concern about the present state of the resource and fear a drastic shortage of caviar within the near future (Josupeit, 1994; Taylor, 1997). It seems inevitable that trade in caviar, both legal and illegal, is bound to shrink in the coming years and will fail to supply demand (DeMeulenaer and Raymakers, 1996).

The dramatical decline in sturgeon resources within the last years (about 50%) will soon lead to a decline in the quantity of caviar which can be offered on both the national and international market.

Illegal trade. According to several experts and TRAFFIC (1995) illegal catch of sturgeons (mainly the three commercially important species *Acipenser gueldenstaedtii*, *Acipenser stellatus*, *Huso huso*) is of major concern, accounting for perhaps more than 90% of all sturgeon caught in the Caspian Sea. In Russia, widespread illegal fishing for sturgeon is known to be practised, motivated by international demand for the highly priced caviar which cannot be met by the legal production. The illegally traded products are caviar and to a lesser degree the meat. Whereas the meat is probably for domestic consumption only, caviar is mainly smuggled outside the country and subject of an international illegal trade. This much is testified to by the 1452 sturgeon poachers detained and the more than 5 metric tons of illegally caviar and 113 metric tons of sturgeon confiscated in Russia in 1994 (according to the Ministry of Internal Affairs). In the Astrakhan region, the Russian centre of caviar trade, seven caviar canning plants operating illegally were closed down in the same year. Also in 1994, an additional 21 metric tons of sturgeon meat and 10.5 metric tons of caviar were confiscated as products of unauthorised fishing in other Russian regions (TRAFFIC, 1995).

Large-scale smuggling and exporting of caviar has also developed in almost all range states of the Caspian Sea and illegal trade channels led or still lead through Turkey and Dubai, as well as Germany and U.S.A. (Taylor, 1997).

Since April 1998, the trade of sturgeon products on the international market is monitored by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) regulations in order to stop the unsustainable rate of illegal trade.

Artificial propagation. The two major sturgeon producing countries, e.g. the Russian Federation and Iran have ranching programmes for sturgeon species, including *Huso huso*.

The Russian Federation already began the artificial breeding and raising of sturgeons in the 1960s. Barannikova et al. (1995) report that in the early 1980s, 20 sturgeon hatcheries were operating in Russia, including ten hatcheries in the Caspian Sea basin (of which eight were located on the lower Volga) and seven hatcheries in the Sea of Azov basin, while three hatcheries on Siberian rivers were producing *Acipenser baerii*.

Since 1994, only two-four of the former eight hatcheries are still operating in the Volga River delta (V. Birstein, pers. comm.). According to Khodorevskaya et al. (1997) these hatcheries released about 10 million beluga sturgeon juveniles, and in 1994 about 12 million juveniles of *Huso huso* had been produced. However, in 1995, only 80 beluga females were caught in the northern part of the Caspian Sea of which only 35 were used for artificial breeding (Birstein, 1996a). This number of females is not sufficient for the efficient raising of juveniles and the artificial reproduction of the species is threatened.

In the former USSR, a large amount of the sturgeon fry produced by this artificial propagation was transported to the northern Caspian Sea by special hatch boats and then released to the feeding grounds which are located in this area (Levin, 1995). This procedure guaranteed a high survival rate for the juvenile sturgeons as compared to the release into the rivers where the young fish may be caught by predators and do not find suitable food organisms. However, Levin (1995) reports that the number of sturgeon fry that was transported to and stocked into the Northern Caspian Sea was zero since 1993.

In the Sea of Azov basin, hatcheries located on the Don River stopped the artificial reproduction and release of beluga sturgeon juveniles in 1992, but a hatchery located on the Kuban River is still working efficiently and successfully raised and released 116.000 beluga juveniles in 1994 (Chebanov and Savelieva, 1995).

Iran is also artificially propagating sturgeons since 20 years when the first hatchery was built in Rasht. According to the Iranian SHILAT, currently 5 hatcheries are working for the restocking programme of sturgeon species. The annual fry release in Iranian waters was about 3.4 million sturgeon juveniles, the different species not further distinguished.

The ranching of *Huso huso* is contributing to a relative high degree to the size of the population and thus to the commercial fishery. In 1993, the estimated portion of *Huso huso* originating from hatcheries in the lower Volga River was about 91% (Barannikova, 1995) while in the Sea of Azov, about 100% of the Russian sturgeon catch is from hatchery-grown fish and the population is only supported by artificial breeding.

Fish farming. Beside ranching, in 1985 the USSR also started extensive fish farming of sturgeons, presumably also including *Huso huso*, in warm effluent waters of thermal power stations. According to Barannikova et al. (1995) the total annual production of pond-reared sturgeon was about 200 metric tons within the area of the Russian Federation and about 200 metric tons in the Ukraine. These figures are given for all sturgeon species (four different species and six different hybrids are grown). The so produced fish are contributing to the domestic demand for sturgeon meat. Caviar from sturgeon species grown in aquaculture is still of inferior quality and not produced in significant quantities.

4. Protection status and needs

4.1 National protection status

The national legal status of *Huso huso* within its range states is insufficiently reported.

The Sea of Azov population of *Huso huso* has been recommended for listing in the Red Data Book of the **Russian Federation** (Pavlov et al., 1994).

In **Hungary**, the species is fully protected by national law.

4.2 International protection status

Huso huso is listed in Appendix III of the Bern Convention (protected fauna).

Huso huso is listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

4.3 Additional protection needs

Detailed recommendations for the conservation of the Eurasian sturgeon species - worked out during the 1st Meeting of Representatives of the Range States on Developing Measures for the Conservation of Sturgeon Species under CITES Provisions (Moscow, Russia, 19-23 January 1998) -are attached in the Appendix at the end of the document.

5. Range States

The Range States of the **Caspian Sea population** of *Huso huso* are
- Azerbaijan
- Iran
- Kazakhstan
- Russian Federation and
- Turkmenistan.

The Range States of the **Black Sea – Sea of Azov population** of *Huso huso* are
- Austria (Ex)
- Bulgaria
- ? Croatia
- Czech Republic (Moravia, Ex)
- ? Georgia
- Germany (Ex)
- Hungary (Ex)
- ? Moldova
- Romania
- Russian Federation
- Serbia
- Slovakia (Ex)
- Turkey, and
- Ukraine.

The Range states of the **extinct Adriatic Sea population** of *Huso huso* were
- Croatia
- Greece
- Italy, and
- Slovenia.

According to FAO-data these countries are also the major fishing countries in the range area of the species.

6. Comments from Range States

The Range States of the species have been provided with a copy of a draft proposal (Inclusion of 18 species of Acipenseriformes in Appendix II of CMS) and were asked for their comments. The appreciated scientific comments and corrections are integrated in the text. The position of each Range state on the proposal are as follows:

- Caspian Sea population:
  - **Azerbaijan** agrees to the proposed inclusion of 18 sturgeon species in Appendix II of CMS and considers that it is very important to protect sturgeons in the Caspian Sea.
  - **Kazakhstan** expressed the opinion that it considers possible the inclusion of sturgeons in Appendix II of CMS with the aim of taking measures on their conservation in the Caspian Sea.
  - **Iran** has not submitted any comments until the end of May 1999.
  - The **Russian Federation** wishes to discuss its comments on the proposal with Germany in a German-Russian working group „Nature Conservation and Biodiversity“ in Munich, Germany, in September 1999.
  - **Turkmenistan** has not submitted any comments until the end of May 1999.

- Black Sea – Sea of Azov population:
  - **Austria** mentions that it is not a Party to CMS. However, Austria supports the proposal and its entire contents.
  - **Bulgaria** has not submitted any comments until the end of May 1999
  - **Croatia** gives its full support to the proposal.
  - The **Czech Republic** states that it has no objection to the proposal.
  - **Georgia** fully agrees that the population status of almost all sturgeon species gives reason for major concern. It states that the conservation of sturgeon species would be even more facilitated in case of inclusion of these species into Appendix II of CMS. Furthermore, Georgia envisages the elaboration of a strategy for the conservation of sturgeon species and expresses its interest in the creation of a global network for the exchange of information on research, monitoring and conservation of all sturgeon species. Finally, it notes that the conservation of migratory species – including sturgeons – is only conceivable by the means of international conservation.
  - **Hungary** considering the conservation status of these species supports the proposal. Hungary seconds the inclusion of the 18 species of Acipenseriformes in Appendix II, excluding the sterlet (*Acipenser ruthenus*), the status of the population of which does not give reason for major concern in the country.
  - **Moldova** has not submitted any comments until the end of May 1999.
  - **Romania** supports the proposal. Considering the population status, the migration tendencies and areas of the six sturgeon species living in Romania as well as in 4 other Range states, the proposal to list these species in Appendix II is justified. The inclusion in Appendix II of CMS creates the basis for the realisation of international conservation programmes in the Range states of the lower Danube and the Black Sea.
  - The **Russian Federation** wishes to discuss its comments on the proposal with Germany in a German-Russian working group „Nature Conservation and Biodiversity“ in Munich, Germany, in September 1999.
  - **Slovakia** submitted „only“ a list of very appreciated scientific comments which are now integrated in the text.
  - **Turkey** has not submitted any comments until the end of May 1999.

- **Ukraine** has not submitted any comments until the end of May 1999.

- Adriatic Sea population:
- **Croatia** gives its full support to the proposal.
- **Greece** informs that there have been only sporadically reported sturgeon species in the Greek territory.
- **Italy** supports the proposal (verbal communication in the EC Habitat Committee, 28.04.1999).
- **Slovenia** supports the proposal.

7. Additional Remarks

Huso huso is sympatric with *Acipenser gueldenstaedtii*, *Acipenser persicus*, *Acipenser stellatus* and *Acipenser nudiventris*.

The species is closely related to the kaluga, *Huso dauricus*, which is an endemic of the Amur River system. The two species are the only members of the genus *Huso.*

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