

Acipenser baerii Brandt, 1869

Siberian Sturgeon
Esturgeon sibérien

Order: ACIPENSERIFORMES

Family: ACIPENSERIDAE

SUMMARY

Siberian Sturgeon (*Acipenser baerii*) may live for up to sixty years and generally reach sexual maturity between 18 and 28 years of age, except in the Lena River where fish mature sexually around 9-12 years of age. The maximum weight recorded is 210 kg, but *A. baerii* usually weigh approximately 65 kg. Little information is available on the current population status for this species in China and Kazakhstan. However, the limited data available for the Russian Federation show that the spawning area has declined by up to 40% in some areas due to dam construction and increased abnormal oogenesis has been observed, probably due to chemical and nuclear water pollution. The population in China is low and economically insignificant.

Catch volumes in the Russian Federation have generally declined, probably as a result of the above listed anthropogenic disturbances as well as over-fishing. However, the Russian Federation is the only country where significant levels of catches have been reported. The annual catch of *A. baerii* in the Ob'-Irtys River basin decreased from 1,410 tonnes (t) in the 1930s to 11 t in 1997. Annual catches in the two other major Siberian rivers in the late 1990s were 16 t per year in the Yenisey River and 13-20 t per year in the Lena River. The Lena population of *A. baerii* is most commonly bred in captivity, because it completes its life cycle in freshwater and sexually matures relatively early. Virtually all international trade in *A. baerii* (caviar, fertilised eggs and live fish) for 1998 detailed in CITES annual reports was from captive-bred sources from France (280 kg of caviar and 160,000 live juveniles) and the Russian Federation (probably fertilised eggs). The export quota set for caviar by the Russian Federation declined from 19,000kg for 1998 to 400 kg for 2000. Additionally, for 2000 the Russian Federation has set export quotas of 3,000 kg of meat and fertilised eggs of *A. baerii* as well as of three different hybrids.

DISTRIBUTION AND POPULATION

The UNEP-WCMC database of CITES-listed species lists the distribution of *Acipenser baerii* as: China, Kazakhstan and the Russian Federation (Anon., 2000a).

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

VU A2d Russia

A. b. baerii EN A2d Russia [Ob and Taz rivers]

A. b. baikalensis EN A1ace Russia [Lake Baikal]

A. b. stenorrhynchus VU A2d Russia [Yenisei, Lena and east Siberian rivers]

China: There is little information about the distribution of *A. baerii* in China, but it is reported to occur within the Irtys River system of Xinjiang (Lake Zaysan, Kara, Irtys and Ertix rivers, tributaries of the Irtys River) (Qing Jianhua, pers. comm., cited in: CITES Management Authority of China, *in litt.* to TRAFFIC Europe, 28 August 2000). Ruban notes that *A. baerii* inhabits the part of the Irtys River (Tchernyi Irtys) flowing through China to the Kren River (Ruban, 1997; 1999).

Kazakhstan: *A. baerii* inhabits part of the Irtys River including Shulbinskoe, Ust-Kmenogorskoe and Bukhtarminskoe reservoirs (Ruban, 1999).

Russian Federation: *A. baerii* inhabits virtually all large rivers in Siberia (Sokolov and Vasil'ev, 1989). Its range extends south from the Lena River basin and Ob' Bay to the Cherniy, Irtys and Selenga rivers. Longitudinally, it is found from the Ob' to the Kolmya rivers. The populations inhabiting the Ob'-Irtys basin and Lake Baikal are included in the Russian Federation Red Book, with stocks having declined throughout the country (Dr. G. Ruban, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Three subspecies are recognised. *A. baerii baerii* is restricted to the Ob' River and its tributaries. This subspecies migrates to Ob' Bay during the winter due to seasonal oxygen deficiency in the Ob' River; numbers are reported to be very low (Ruban, 1996; 1997).

A. baerii stenorrhynchus occurs in the basins of the East Siberian Rivers (Alazeya, Anabar, Indigirka, Khatanga, Lena, Lolya, Olenek, Pyasina, Yana and Yenisei. (Ruban, 1997; Ruban and Akimova, 1991; 1993; Ruban and Panaiotidi, 1994). Two forms of this subspecies are recognised. The migrating form, which swims considerable distances upstream from estuaries and deltas to spawn, is more numerous than the non-migratory form. The constant reduction in fisheries catch statistics reflects declining populations (Dr G. Ruban, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

A. baerii baikalensis is a unique lake form from Lake Baikal, which migrates to the Selenga River to spawn. The majority of the population occurs in the northern part of the lake near to the Selenga River delta and the Barguzinskii and Chivyркуuskii bays, and is rarely encountered in the south. From the northern areas it migrates into the large tributaries of the lake, up to 1,000 km upstream in the Selenga River, and also enters the tributaries of the Chkoi, Delger-Muren, Orhon and Tula rivers. In the mid-1990s, the subspecies was reported to be extremely rare (Ruban, 1997).

However, recent studies suggest that *A. baerii* may be monotypic and forms continuous populations in large river systems (Ruban, 1999).

Introduced populations:

France: In December 1999 several thousand juvenile and several hundred gravid females (more than 7 kg specimens) of *A. baerii* escaped into the Gironde River (Bordeaux region) during two storms. The survival of the escaped fish and their effect on the wild population of *A. sturio*, are unknown. However, the introduction of new pathological germs, food competition in case of acclimatisation of the exotic specimens, and hybridisation with *A. sturio* must be taken into consideration (Cemagref, *in litt.*, press release, 26 January 2000).

Germany: In the Baltic Sea river estuaries east of Rostock (Germany) and further upstream, hybrid sturgeon, including hybrids with *A. baerii*, have been caught. These probably originate from upstream aquaculture farms, or were released by private aquaria due to their large size (Jörn Gessner, Institute of Freshwater Ecology and Inland Fisheries, pers. comm. to TRAFFIC Europe, 15 March 2000).

Italy: The species has been introduced in captive breeding facilities and hybridised with Adriatic Sturgeon *A. naccarii* in Italy in the 1990s (Azienda Agricola and Agroittica Lombarda, Italian sturgeon farmers, *in litt.* to TRAFFIC Europe-Italy, 1999). *A. baerii* are occasionally found in the wild; fish sporadically escape from rearing plants or angling ponds, or are released when they become too large for private aquaria (Dr P. Bronzi *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000). There is no documentation on the potential damage of the introduction of exotic Acipenseriformes and their hybrids on native species. If specimens of *A. baerii* escape to the open waters of the Po River and become an "invasive species", this may threaten the Adriatic Sturgeon *A. naccarii*, a species that is on the brink of extinction.

Russian Federation: *A. baerii* has been introduced to Lakes Ladoga, Pskov-Chud, Seliger and others in the Baltic watershed and to the Gor'kov and Volgograd impoundment along the Volga and in manmade lakes downstream from Moscow (Berdichevskii *et al.*, 1983, cited in Sokolov and Vasil'ev, 1989). However, long-term studies have rarely found introduced *A. baerii* in these water bodies (V. S. Malyutin, pers. comm., cited in Dr G. Ruban, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

HABITAT AND ECOLOGY

A. baerii can reach a maximum length of 2 m and weight of 210 kg. However, it usually does not exceed 65 kg in weight with a maximum age of approximately 60 years (Sokolov and Vasil'ev, 1989). Only the Lena River population reaches sexual maturity at 9-10 years for males and 10-12 years for females; all other populations reach sexual maturity at 18-24 years for males and 24-28 years for females. The

minimum recorded size for spawning is 0.6-0.9 m in length and 0.7 kg in weight (Hochleithner and Gessner, 1999). The spawning season is from May to June. *A. baerii* feeds predominantly on benthic organisms including chironomid larvae and river amphipods, isopods and polychaetes (Sokolov and Vasil'ev, 1989).

The results of *A. baerii* captive breeding suggest that young females (two years after reaching sexual maturity, minimum age ten years), born and bred in captivity, may bear 10% of their weight in caviar, while for 18-year old females the yield is 18-20% (T. Rouault, Cemagref, pers. comm. to TRAFFIC Europe, 27 September 2000). Therefore the average rate most commonly used is 12-13% per female and 6-7% for the whole catch, assuming that 50% of the catch are males (1:1 sex ratio of the population).

THREATS TO SURVIVAL AND DOMESTIC USE

China: The size of the population is relatively small and economically insignificant (CITES Management Authority of China, *in litt.* to TRAFFIC Europe, 28 August 2000).

Russian Federation: Much of the habitat of *A. baerii* has been lost due to the damming of many Siberian rivers since the 1950s. The migratory forms have been particularly affected because they can no longer access their spawning sites. There is little documentation as to the extent of habitat loss. Forty percent of the spawning habitat of the migrating form of *A. baerii stenorrhynchus* has been lost in the Ob'-Irtys' River due to construction of the Novosibirsk, Ust'-Kamengorsk and Shul'binsk hydroelectric power stations (Ruban, 1996). The Yenisey River and Lena River populations have been similarly affected, losing 500-600 km and 300 km of habitat respectively. The development of oil extraction facilities and the use of pesticide in agriculture in the Yenisey River have polluted Siberian rivers (Ruban, 1997). Pollution has drastic effects on fish physiology and has consequently reduced the already low fecundity of all sturgeon species by causing degenerative oocytes (Akimova and Ruban, 1995). In the 1980s, oil and petroleum products in the Ob' River exceeded permissible levels by a factor of ten (Green, 1993). Many Siberian rivers are contaminated by radioactive substances and eastern Siberian rivers are polluted by the gold mining industry (Akimova and Ruban, 1995).

Law enforcement appears to be lacking and numerous experts as well as high position officers claim that the wild population is highly threatened by increasing illegal fishing and trade in caviar in a large part of the range (Anon., 2000b).

In the 1930s, the annual recorded catch of *A. baerii* in the Ob'-Irtys' rivers basin reached 1,410 t. By 1997, this figure had dropped to 11 t (Ruban, 1999). The ratio between illegal and legal catch in the Ob' River in 1994 was estimated at 300 t to 11 t (Ruban, 1996).

Russian catch of *A. baerii* in three large Siberian rivers (tonnes)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Ob'	73	74	48	63	48	57	26	15.9	17	11.5	n/a	6.7	11
Yenisey	23.4	28.1	30.4	20.7	17	40.6	36.9	31.1	42.4	44.1	n/a	33.	n/a
Lena	8.8	11.2	8.7	15.2	8.2	9.5	14.9	4.9	5.4	17.2	12.9	21.	9
Total	105.	113.	87.1	98.9	73.2	107.	77.8	51.9	64.8	72.8		61.	
	2	3				1						9	

Source: Ruban, 1999

Current catch in the Yenisey River does not exceed 16 t per year, and the Lena River annual catches are approximately 13-20 t. In other Siberian rivers (Anabar, Indigirka, Khatanga, Kolyma, Olenek and Yana) stocks have always been relatively small. There are no recent catch data available for Yakutian (Republic Sakha-Yakutiya of the Russian Federation) rivers (Anabar, Indigirka, Khatanga, Kolyma, Lena, Olenek and Yana) (Anon., 2000b).

INTERNATIONAL TRADE

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

Gross exports and the comparative tabulation of trade in *A. baerii* in 1998 are given in the Appendix. CITES Annual Reports for 1998 suggest that the international trade in wild specimens of *A. baerii* was extremely limited in 1998: 283 kg "eggs", 360,950 live fish (including 160,000 of captive-bred sources from France and 200,000 of unknown origin that were seized by the US Customs) and 433 kg of meat of captive-bred source from Uruguay. The export of 283 kg "eggs", comprised 280 kg caviar of captive-bred source from France and 3 kg of eggs (probably fertilised eggs destined for captive breeding facilities, but could be caviar; see *Note* at the end of the section) from the Russian Federation to Greece. Together with *A. transmontanus* White Sturgeon, *A. baerii* is one of the most common sturgeon species bred in captivity for meat. Captive breeding of *A. baerii* for caviar is limited to France, with the majority of caviar being consumed within the European Union (EU). Internal EU trade does not require CITES permits and is therefore not recorded in CITES Annual Reports.

"Live" specimens and fertilised "eggs" were probably destined to supply aquaculture farms and the growing demand for private aquaria. Germany and Hungary are also involved in the international trade of live first generation and captive-bred specimens respectively. "Meat" is the major production of sturgeon farms (see "Captive Breeding").

Exports of *A. baerii* from Russia in 1999 (kilogrammes)

	Quantity	Description	Importer	No of permits
<i>A. baerii</i>	27.50	Live eggs	HU, PL, DE, US, AM, IT, SY	10 Export
	300.00	Live fish	KR	2 Export
Hybrids:				
<i>A. baerii</i> x <i>A. gueldenstaedtii</i>	3.50	Live eggs	PL, DE	2 Export
<i>A. gueldenstaedtii</i> x <i>A. baerii</i>	37.50	Live eggs	CN, SY	3 Export

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

Export quotas set for *A. baerii* and its hybrids— (kilogrammes)

	1998	1999	2000	
	Caviar	Caviar	Caviar	Meat Fertilised Eggs
Russian Federation	19,000	2,000	400	3,000 30
Hybrids:				
<i>A. baerii</i> x <i>A. gueldenstaedtii</i>				10
<i>A. gueldenstaedtii</i> x <i>A. baerii</i>				70
<i>A. baerii</i> x <i>A. ruthenus</i>				15
Total	19,000	2,000	400	3,000 125

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

Illegal trade: A large shipment (200,000 live fish) of *A. baerii* of unknown origin was confiscated by the US Customs. Poaching and smuggling are closely related and have been intensively reported in the media of range States and importing countries (Evtouchenko, 1997; Mc Donald, 2000; Snyder, 2000). However, a great deal of illegally caught sturgeon is destined for the domestic market, particularly meat (Anon., 1998).

Note: The use of the term “eggs” and the unit “kg” or “g” to describe shipments of both caviar and fertilised eggs complicates the analysis of trade data. Similar difficulties arise from the unit used for export quotas of fertilised eggs, which is kilogramme (“kg”) instead of “number of specimens”. Kilogrammes do not directly correspond to the number of specimens, and hence does not allow the effective evaluation of quotas.

CONSERVATION MEASURES

China: Insufficient studies have been undertaken to determine necessary conservation measures for wild populations of *A. baerii* (CITES Management Authority of China, *in litt.* to TRAFFIC Europe, 28 August 2000).

Russian Federation: The Lake Baikal population was listed in the Red Data Book in 1983 (Ruban, 1997) and the Ob’ River population in 1998. In the late 1990s, commercial catch in the Yenisey River was prohibited due to rapidly declining populations and their extremely low fecundity (Anon., 2000b), caused by inaccessible spawning grounds and impact of pollution (Ruban, 1997). Catch for scientific and monitoring purposes, as well as subsistence use is limited to 8 t for *A. baerii* (Anon., 2000b).

Available data suggest that amendments of previous regulations and/or adoption of new legislation are in effect in Russian Federation. However, enforcement measures appear to be lacking and numerous experts as well as high-ranking officials have reported the increasing pressure of illegal fishing practices and criminal activities around caviar trade in a large part of the range (Anon., 2000b).

Russian scientists hold a few specimens of *A. baerii baikalensis* in a hatchery near Moscow for research and conservation (gene bank) purposes (Birstein, 1993). Approximately 300,000 larvae are reintroduced annually to Lake Baikal (V.S. Malyutin, pers. comm. to G. Ruban, *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

CAPTIVE BREEDING

A. baerii is one of the most frequently captive-bred species of sturgeon. *A. baerii stenorrhynchus* have been successfully bred in several European countries (Sokolov and Vasil’ev, 1989; Willot *et al.*, 1991).

Caviar is not the main product of sturgeon farms. The economic viability of a sturgeon farm depends on the existence of a meat market, particularly until females have reached sexual maturity, during the first 8 to 10 years. Once the stock of caviar producers is constituted, one tonne of caviar per year is correlated to the production of 20 t of sturgeon meat (C. Raymakers, TRAFFIC Europe, *in litt.* to Pr R. Billard, National Natural History Museum, Paris, May 1999).

Western and Central Europe: M. Hochleithner (*in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000) specifically names the following countries: Austria, Belgium, France, Germany, Hungary, Italy and Spain. In 1997, Bronzi *et al.* (1999) estimated the total annual captive-bred production of Siberian Sturgeon to be approximately 200 t in France, 120 t in Italy (pure species and hybrids), and 10 t in Germany.

Bulgaria: Only one Bulgarian hatchery exists. Established in 1997 in Boliartzi village (Plovdiv region), the hatchery has a total capacity of 60,000 juveniles. All juveniles released in the Bulgarian part of the Danube River from 1998 to 2000 were produced here. In 1998, a total of 200 hybrid fingerlings of *A. gueldenstaedtii* x *A. baerii*, with an average weight of 200 g, were released in the Ovcharitza dam reservoir. 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).

China: In recent years, more than 200,000 fertilised eggs of *A. baerii* have been imported by China from Germany and the Russian Federation for aquaculture. Although not recorded in the CITES Annual Reports, small quantities of fingerlings and live juvenile *A. baerii* of captive bred sources were exported from China in 1998 (CITES Management Authority of China, *in litt.* to TRAFFIC Europe, 28 August 2000).

France: The production of *A. baerii* caviar from aquaculture exceeded three tonnes in 1999 and is expected to reach five tonnes in 2000 (A. Jones, Manager of a *A. baerii* farm in France, pers. comm. to TRAFFIC Europe, 22 September 2000). Based on estimates made (C. Raymakers, TRAFFIC Europe, *in litt.* to Pr R. Billard, National Natural History Museum, Paris, May 1999), this implies a minimum annual production of 100 t of meat of farmed Siberian Sturgeon.

Italy: *A. baerii* has been bred for human consumption (meat) and sport angling in private closed basins since 1997. These specimens originated from larvae imported from France, Hungary and, since 1998, Italy (Dr P. Bronzi *in litt.* to IUCN/SSC Wildlife Trade Programme, September 2000).

Japan: *A. baerii* has been introduced into aquaculture in Japan (Katsumi and Genjiroi, 1977) but there are no production figures available.

Uruguay: According to CITES data, the US imported *A. baerii* meat of captive-bred source from Uruguay.

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Gross exports* and export quotas for *Acipenser baerii* 1998

TAXON	TERM	UNIT	Exporter	1998	Export quota 1998 (kgs)
<i>Acipenser baerii</i>	Bodies		FR	24	
<i>Acipenser baerii</i>	Eggs	kg	FR	280	
<i>Acipenser baerii</i>	Eggs	kg	RU	3	19,000
<i>Acipenser baerii</i>	Live		DE	400	
<i>Acipenser baerii</i>	Live		FR	160,000	
<i>Acipenser baerii</i>	Live		GB	550	
<i>Acipenser baerii</i>	Live		XX	200,000	
<i>Acipenser baerii</i>	Meat	kg	FR	83	
<i>Acipenser baerii</i>	Meat	kg	UY	350	
<i>Acipenser baerii</i>	Other		CH	50	

Comparative tabulation of trade in *Acipenser baerii* 1998

Year	Imports reported						Exports reported						
	Imp.	Exp.	Origin	Quantity	Unit	Term	P	S	Quantity	Unit	Term	P	S
Eggs													
1998	GA	FR							100 kg	eggs	T	C	
1998	MA	FR							50 kg	eggs	T	C	
1998	US	FR		61 Kg	eggs	T	C		130 kg	eggs	T	C	
1998	GR	RU							3 kg	eggs	T	C	
	Total:			61 Kg					283 kg				
Live fish													
1998	CZ	DE		200	live	T	F						
1998	PL	DE		200	live		F		200	live	T	F	
1998	CN	FR							150,000	live	T	C	
1998	HK	FR							5,000	live	T	C	
1998	MA	FR							5,000	live	T	C	
1998	XX	GB	HU						550	live	T	C	
1998	US	XX		200,000	live	T	I						
	Total:			200,400					160,750				
Other specimens													
1998	CH	FR		24	bodies	T	C						
1998	CH	FR							83 kg	meat	T	O	
1998	US	UY		350 kg	meat	T	C						
1998	DE	CH	XX						50	other		O	

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).